Railway Age Gazette

Including the Railroad Gazette and the Railway Age

PUBLISHED EVERY FRIDAY AND DAILY EIGHT TIMES IN JUNE, BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
83 FULTON STREET, NEW YORK.

CHICAGO: Transportation Bldg. CLEVELAND: Citizens' Bldg.
LONDON: Queen Anne's Chambers, Westminster.

E. A. SIMMONS, *President.*
L. B. SHERMAN, *Vice-President.* HENRY LEE, *Sec'y & Treas.*
The address of the company is the address of the officers.

EDITORS.
SAMUEL O. DUNN, *Editor.*

ROY V. WRIGHT, *Managing Editor.*
W. E. HOOPER
B. B. ADAMS
E. T. HOWSON
H. H. SIMMONS
H. F. LANE
R. E. THAYER
A. C. LOUDON
E. S. FAUST
F. W. KRAEGER
A. D. CLOUD
GEORGE L. FOWLER
WILLIAM FORSYTH
S. W. DUNNING

Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico.....$5.00
Canada 6.00
Foreign Countries (excepting daily editions)..... 8.00
Single Copies .....15 cents each

Engineering and Maintenance of Way Edition and four Maintenance of Way Convention Daily issues, North America, $1.00; foreign, $2.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

WE GUARANTEE, that of this issue 8,250 copies were printed; that of those 8,250 copies, 6,796 were mailed to regular paid subscribers and 140 were provided for counter and news companies' sales; that the total copies printed this year to date were 113,309 copies—an average of 8,716 copies a week.

VOLUME 54. MARCH 28, 1913. NUMBER 13.

CONTENTS

*Illustrated.

A STATION agent should be paid what he is worth. Everybody will agree to this. But how to decide the rate of pay is not easy. The significance of the letter on this subject, printed in another column, is in the suggestion which it gives that a straight-edge is not a suitable instrument for regulating agents' pay. To the superintendent this suggestion is a reminder that labor-union principles, forever seeking "standardization," do *not* apply. But the absence of the stimulus of the labor-union grievance committee throws on the superintendent all the greater responsibility for seeing that no grievance arises. "Each case should be considered on its own merits." This means that the superintendent must know *very much* more about the work, at some of his stations, than superintendents usually know. In the absence of well-defined rules for grading the salaries of agents and fixing the number of helpers that they should have, a constant effort to increase the quality of the service will, in the long run, indicate quite well what ought to be done; for if agents are made more efficient, and if this policy is pursued vigorously, the men, when not adequately paid, will resign and go into other business. At any rate the younger men will do this; and these men's status should be reasonably well defined before they become old. An efficient agent, popular in his own town, should have his pay slightly increased every few years. In sticking to the policy of advancing agents only by transferring them to another station, a railroad often goes against its own interest. The worth of a station agent, like that of a physician, or a lawyer, is in large degree measured by his popularity, which in the majority of cases is a plant of slow growth. At least, it is one that cannot be forced.

FOR a number of years the electrical night of the New York Railroad Club has been one of the features of the year's program. Heretofore the discussion has been marked by the crispness of the ideas advanced and the, sometimes, sharp controversy between advocates of rival systems, coupled with some more or less poignant prognostications of what the future was to bring forth. But this atmosphere of the meeting was dissipated on Friday last, and the entire tone was changed from that of a few years ago. The discussion opened with the somewhat startling statement that no new electrification work of steam railroads had been undertaken during the past year. There had been some extensions, but no new work, and the reason given was the frank one that nothing had come up that warranted electrification. It was stated as a matter of course. The flamboyant attitude of the electrical engineer of a dozen years ago, which has been gradually disappearing, showed no signs of even a past existence. The atmosphere was one indicating a settled state of affairs. Electricity no longer needs an advocate. Its capabilities and limitations are known, and it is accepted by all at its face value, and, so, it has dropped out of sight as a question to be discussed as to its availability and possibility of application. It can be made to do its work and its adoption has become merely a matter of local conditions, operating facilities and cost.

ONE of the fundamental contentions of the firemen in presenting their demands for higher wages to the board of arbitration is that labor and, in this specific instance, firemen should share in the increase in revenue of railroads due to increased efficiency of the plant and to the greater volume of business. In presenting their case and in examining both their own witnesses and cross examining the railroads' witnesses they have at times confused with this contention certain socialistic doctrines which may be inadequately summarized by saying that they demand that while labor be protected from any of the risks of a business enterprise, it shall, on the other hand, share proportionately with those who take the risks in profits, if the business turns out to be profitable. On Tuesday issue was squarely joined on the underlying contention of the firemen, in the testimony of D. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West. Carefully prepared figures had been submitted showing that from actual observation it was clear that there was no relationship between the weight of a locomotive and the work of a fireman. Mr. Crawford gave it as his unhesitating opinion that larger locomotives now in service were not worked in general as close to capacity as were the smaller locomotives in service some years ago, and that if the work of the fireman varied in any fixed ratio, it was

more nearly in proportion to the percentage of work that was being gotten out of a locomotive, compared to its total capacity, than on any other basis. Mr. Crawford was asked whether in his opinion the heavier trainloads and greater traffic density were due to any added effort or any increased efficiency on the part of the man firing the locomotive. His answer was an unqualified "no." Cross examining Mr. Crawford, Mr. Carter asked him whether this was not from the point of view of the employer, implying, as we understand it, that the employer's point of view is that labor should not be allowed to share in the profits. in the gaining of which they took no risk; but Mr. Crawford and probably Mr. Carter himself were not confused by this secondary issue. Mr. Crawford made it unmistakably plain that, regardless of any theory supposed to be held by employers at variance with the theories of organized labor, in his opinion the fireman had contributed nothing whatsoever as a factor in the development of heavier trainload and greater traffic density. If we understood Mr. Crawford correctly, the fireman has no more claim to a share in the increase in earnings on freight due to larger locomotives than has the mechanical draftsman who copies from an engineer's instructions the drawings of this locomotive.

THE address by Halford Erickson, member of the Wisconsin Railroad Commission, an abstract of which is published elsewhere in this issue, is of especial interest at this time for several reasons. The general subject of regulation of public utilities by commissions is prominently before the public; and Mr. Erickson's address is a broad statement and discussion of the policy of regulation followed by a commission that has large powers and has for some years been recognized, regardless of changes in its personnel, as one of the ablest and fairest regulating bodies in the country. The specific subject of valuation of railways also is prominently before the public, Congress having just passed a law providing for a valuation of all the railways in the United States; and Mr. Erickson tells in detail how valuations of all kinds of public utilities, including railways, are made, and the factors that are included, by a state commission that has studied this subject thoroughly from the standpoints of law, economics and public policy, and that has had a long and varied experience in making public utility valuations. Finally, the address gains interest from the experience and personality of its author. Mr. Erickson, prior to his appointment to the Wisconsin commission, was active in the politics of his state, was a supporter of the LaFollette wing of the republican party, and was one of Governor LaFollette's original appointees to the commission in 1905, when it was reorganized with largely increased powers. The other members appointed at that time were John Barnes and Prof. B. H. Meyer, both of whom long since retired from the commission. Mr. Erickson is, therefore, the oldest member of the Wisconsin commission in point of service. In view of all these facts, the moderate tone of Mr. Erickson's address, and his outline of the principles and methods that should be followed in public regulation, have much significance. His utterances are equally different in form and substance from those the public is accustomed to hearing from the radicals among politicians and railroad commissioners, and from the extreme conservatives among public utility managers. Undoubtedly both the tone and substance are partly due to the fact that Mr. Erickson has a natural disposition to be moderate; but they must also be very largely due to his thorough study of and great experience with the matters he discusses. The basis of the hope for the success of government regulation in the United States is that the number of moderate men among both those who regulate public utilities and those who manage them, is, as indicated by their public utterances, rapidly increasing and that it will continue to do so; for experience in this country has shown that men of moderate temper and views can usually agree on and carry out harmoniously sane and fair policies.

GRADE AND CURVE REDUCTION.

FEW subjects are of more vital importance in the study of economical railway operation than the extent to which grade and curve reduction should be carried. Several roads are now spending large amounts to secure standards of grade and alinement which would not have been considered practicable a few years ago. Theoretically, the best line between two points is a straight line with a uniform grade. Practically, the topography, possible traffic and ability to secure easier grades may make it advisable to vary considerably from a straight line. A reduction in the ruling grade enables larger train loads to be handled and thereby reduces the cost of operation. On the other hand, an increase in the length of the line increases the cost of construction, the fixed charges and the cost of maintenance. It is important to determine the economical limit to which this increase in length may be carried to secure lower ruling grades. This limit varies on different roads, for the greater the traffic, especially of low grade freight which permits heavy train loading, the greater the amount a road is justified in spending to reduce its grades. Obviously, a road having the traffic density of the Pennsylvania Railroad can afford to spend more to secure low grades than a western line having only a few trains a day.

Other considerations also enter, one being the starting resistance of a train, which is considerably greater than the resistance of the train in motion. Numerous tests have shown this starting resistance to be approximately equivalent to that of a 0.3 or 0.35 per cent. grade. Where possible, therefore, ruling grades are either reduced by this amount near stations, water tanks, signals and other points where trains stop frequently, or these facilities are located on grades lower than the ruling. As trains may occasionally have to stop at any point on the road, many engineers have not considered it advisable to reduce the ruling grade below 0.3 per cent.; but in the last few years lower ruling grades have been adopted on several roads, the first of which was the Spokane, Portland & Seattle, which was built in 1907 with a maximum grade of 0.2 per cent. between Pasco, Wash., and Portland, Ore., a distance of 230 miles. While this line was built along the Columbia river, the low grade adopted materially increased the cost of construction and caused considerable discussion. The Baltimore & Ohio fixed 0.2 per cent. as the maximum grade for a second track across the state of Indiana, which has been built during the past two years. The Erie is building a second track between Meadville, Pa., and Corry, which has the same ruling grade and involves some very heavy work. Measured by the standards of previous years, these grades may not be justified, but their adoption is proof that new standards are being developed.

One argument in favor of such low grades is based on the reasoning followed in adopting momentum grades. Within recent years the momentum or velocity grade has come to be considered approved practice when located between stations where there is no cause for regular stopping of trains. In such cases it is considered advisable to run the risk of a train being stopped by some unexpected cause, which would make it necessary to double to the first siding beyond the top of the grade, or to back down and make another run for the hill. The 0.2 per cent. grade may be operated in the same way if the grades at stations, water tanks and other regular stops are so laid that the virtual grade at these points does not exceed the actual ruling grade.

Even more startling than these standards for grade reduction are those which are being adopted for curves. The Burlington for the past three years has been building a second track along its line extending 300 miles south from St. Paul, Minn., along the east bank of the Mississippi river. The old line was built with a maximum curve of 3 deg. at a moderate cost. In connection with the building of the second track, this standard of curvature is being reduced to 1 deg., which adds considerably to the cost. The Milwaukee has been building a second track between Minneapolis, Minn., and Aberdeen, S. D., the past three years

and is at present double tracking its line across the state of Iowa; and in both cases the maximum curvature is 1 deg. The lines included in this work aggregate over 600 miles and involve some heavy construction. These examples indicate that railways are being built today to standards which were not thought of a few years ago. For this reason the analysis of the various kinds of resistance by Walter Loring Webb in an article elsewhere in this issue is especially valuable. The subject is so important that it deserves serious consideration; and a thorough discussion will help to bring together all the essential facts.

"AMERICAN METHODS" AT HOME AND ABROAD.

THE annual report of the North-Eastern Railway of England for 1912 shows interestingly the results gained on an English railway by what are significantly known as "American methods." Some years ago George Paish, editor of the *Statist* of London, published a series of articles criticising the operation of English railways as unnecessarily costly. These papers were republished in a book entitled "The British Railway Position." The main ground of Mr. Paish's criticism was that the English roads handled their traffic in too small train loads. He sharply contrasted the fact that the train mileage of English railways increased practically as fast in proportion as the amount of traffic they handled with the fact that the railways of the United States, by working steadily to increase their freight train loads, handled a rapidly growing business without a proportionate increase in the number of train miles. The railways of the United States long ago began compiling ton mileage, passenger mileage and train load statistics, and it has been largely by constant study and comparison of these that the railway managers of this county have been able to exercise supervision that has resulted in the development of the very large freight train loads in which business is handled here. Mr. Paish urged the railway managers of England to follow the example of their American brethren. He recognized the fact that owing to differences in conditions, traffic in England could not be handled in as large train loads as in the United States, but he was sure that the train loading of English railways could be increased and that thereby substantial economies could be made.

Mr. (now Sir) George Gibb, then general manager of the North-Eastern, soon afterward introduced "American" methods so far as he thought they were applicable to British conditions. The North-Eastern ever since has compiled and used statistics similar to those of the railways of the United States. The results are indicated by its train load, train mileage and financial figures. In 1902, when it began compiling these statistics, its average goods train load was 59.76 tons; in 1912 it was 95.4 tons. In 1902 its mineral tonnage per train was 113.81 tons; in 1912 it was 183.86 tons. In 1902 its total average tonnage per freight train was 84.23 tons; in 1912 it was 133.84 tons. The increase in its average freight train load in 10 years was 66 per cent.

The average freight train load of the North-Eastern does not seem large when compared with that of the railways in this country, which, in 1910, was 380 tons. But when its trainload is compared with that of English railways in general the showing is quite different. While no trainload statistics for all of the railways of the United Kingdom are available, other statistics that are available indicate that their average trainload is only 85 to 90 tons. The main reasons for the small train loads in England are that the average haul per ton is very short—it was only 24 miles on the London & North-Eastern in 1912—that freight is shipped in small consignments, and that the railways handle it in small cars and in trains that are run on regular schedules and at high speeds. The experience of the North-Eastern shows, however, that the British roads by the use of American methods can increase their train loading. The North-Eastern, largely because it has secured better train loading, has strengthened its financial position. Its property is well maintained; and it announced a dividend for the last half of 1912 at the rate of 7½ per cent. per annum, which is more than twice the average for British railways.

Not many students of railway economics seem to appreciate that the system of economizing by handling freight traffic in large train loads originated in the United States, or how largely it is still confined to this country. For the development of this system the greatest credit to any individual is due to James J. Hill. The only country whose railways handle their freight in anywhere near as large train loads as those of this country is Canada; and there the methods developed in the United States have been applied by railway managers such as Sir William Van Horne, Sir Thomas Shaughnessy and Charles M. Hays, who were born in the United States and received their early railway training here.

The way that the freight traffic of the Canadian roads is handled contrasts sharply with the way in which that of the railways of Australia—the second greatest of British colonies—is handled. The freight traffic density of the Canadian roads is very much larger than that of the New South Wales roads, the average ton miles per mile in Canada in 1912 being 731,776 and in New South Wales only 226,906. While the volume of freight traffic on the New South Wales roads is comparatively light, a large part of it is well adapted to heavy loading, 63 per cent. of it being minerals. Nevertheless, while the Canadian roads handled an average of 325 tons per train in 1912, the New South Wales roads handled an average of only 90 tons per train. In consequence, in spite of the fact that the freight density of the Canadian roads was over 220 per cent. greater than that of the New South Wales roads, the New South Wales roads actually ran more freight trains per mile to handle their very much smaller traffic, the average freight train miles per mile on the Canadian roads being only 2,252 and on the New South Wales 2,512. It is largely owing to this that the Canadian roads can make an average rate of 7.57 mills per ton per mile, while the New South Wales roads charge 1.78 cents.

It strikes a student of American and Canadian railway affairs as rather curious that in Australia, in spite of the light traffic, the matter of "duplicating"—in other words, double-tracking—the lines is being vigorously agitated. Although the New South Wales lines are handling only a traffic which any single track railway in the United States or Canada would handle with ease, it is, nevertheless, a fact that some of their lines are congested. What they are congested with, however, is not traffic but trains. It would seem from their statistics that by increasing their car loads and train loads the New South Wales lines could handle their freight traffic with one-half as many freight train miles per mile as they now run, and thereby make large savings in operating expenses and postpone the time when a large investment in additional trackage will be necessary. Even if they were doubled their freight train loads would be only a little more than half as large as those of the Canadian roads. The Canadian roads handle 63 per cent. more ton miles and passenger miles per mile than those of New South Wales; yet their train miles per mile are 18 per cent. less and their operating expenses per mile are slightly less.

The difference between the rates and operating results of the Canadian and the New South Wales lines, both of them in new and undeveloped countries, show how much more desirable is the application of American methods than of English methods to transportation in such countries. The fact that the New South Wales railways are operated by the government and most of those of Canada by private companies has no small bearing on the matter.

"KEEPING THE BUNK IN BUNKUM."

IN an article in the *Saturday Evening Post* a few weeks ago, Samuel G. Blythe compared the methods in the English House of Commons and in the American Congress. After many years spent in close contact with the American legislator he went to England to take a close look at the legislator and legislation there. He concluded that while there may be a question historically whether it was the English parliamentarian or the American congressman "who first put the bunk in bunkum," there can be no doubt that at some time or other both put it in and that they are both sedulously keeping it there. Congressmen are being assisted in this country by the state legislatures and many other public officials.

Not long ago the Supreme Court of the United States (212 U. S. 1) criticised the disposition of legislative bodies (Congress, legislatures, and city governments) to dodge their duties and leave it to the courts to decide whether private property is being confiscated. Legislators very often "pass it up to the courts," to employ their own language—that is, enact any measure the notion of the hour or the clamor of the street suggests, notwithstanding they may believe it to be unconstitutional or otherwise invalid. This kind of disloyalty to duty and to country has brought undeserved criticism upon the courts for declaring void laws passed by the representatives of the people.

The crying need of the time in getting actual law to conform to business requirements in some way of taking the "bunk out of bunkum." In the House of Commons they have one advantage over us, viz., that, with few exceptions, no bills can be introduced except by the government; that is by the party in power. In this country every member can introduce "bunk" bills without limit.

* * *

For a number of years men seeking to acquire or desiring to retain office have employed the spectacular means of going after "big business" or "the man higher up." This gives the statesman a position in the limelight, does not detract from the voting power behind him, and consequently has become the most popular course to take.

The spectacular regulation of railways has gone so far as to provoke a protest from the sober people of the country, who see that the present earnings of the companies are inadequate for the good of traffic and the safety of the public. But many a quack statesman went into office and achieved distinction by spectacular assaults upon the carriers. The railway companies were largely defenseless; for, even their employees often voted against their interests down to a year or so ago, when many of them began to see on which side their bread was buttered. So the legislator was free to go through his spectacular performance without suffering a loss of votes. Where his activities would alienate voters, or affect unfavorably the interests of those who control votes, he maintains "a masterly inactivity."

There is no objection to the proper supervision of railways to insure reasonable rates and to prevent discriminations. But regulation of railways illustrates what a thundering emphasis has been put upon what is of comparatively little consequence to the man who pays the monthly bills, while matters of living costs bearing with extreme weight on him and his family have passed and still pass unremedied and, indeed, almost unstudied. So when the cry about the steadily increasing cost of living reached its loudest the legislator was unprepared to discuss or deal with the subject. He was bewildered because his ten-year assault on railway rates had proved the prophecy of railroad managers by producing no effect to the benefit of the man who pays the bills. The statesman was outclassed by the occasion and the opportunity; and nothing definite or practical is being done to correct the wasteful and oppressive methods of business that are a real back-breaking weight on the consumer.

Take, for example, the case of the multitudinous class called "middle-men." Sometime ago a railroad officer bought a pound of California cherries in Chicago for 30 cents. The man who had invested his money in the orchard, taken the risks and performed the labor of production, sold the cherries for four cents. The carrier hauled them 2,500 miles for 1.15 cents. The middle-men got the other 24.85 cents. This is not an extraordinary case. The common carrier's charge which enters into the food and clothing and other necessaries of the average family is trifling. Nevertheless, for about ten years the interest and political activities of a school-bred and college-bred country have been turned toward the hammering down of freight rates. If something had been done about eliminating that 24.85 cents on cherries and a similar part of the cost to the consumer of vegetables, eggs, butter, poultry, meat, fruit, and other necessaries, the cost of living might be quite another matter today.

Recently a case was tried before the Interstate Commerce Commission in which middle-men in Kansas complained of freight rates which were prejudicial to them in "their territory" (as they termed it) in comparison with rates paid by middle-men at St. Louis and at Kansas City. There was the so-called "Topeka territory" the "Wichita territory," the "Salina territory," and the "Hutchinson territory," in which the shippers thought they had a right to interject themselves between the consumer and the seller, and thereby add to the costs of living. The consumer should not be obliged to buy in any of the territories mentioned, or in Kansas City or St. Louis, if the thing he wants is not made at one of those places. The consumer should be helped to buy as far as practicable direct from the manufacturer or the producer. Most of the complaints against the rates of carriers made before the Interstate Commerce Commission and before the state commissions have been made by the middle-men, and most of the decisions of the commissions have tended to strengthen and entrench them. The noise of contention which has all but cracked the firmament during the last ten years has not been, as so many think, the sound of combat between freight-payer and carrier between a people struggling to be free and predatory corporations fighting to maintain a thralldom. The strife has been chiefly of middle-man against middle-man, with the carriers and the real freight-payers bearing the burden.

* * *

The monopoly and the largely needless cold storage of eatables has received no adequate attention while the legislator has been "keeping the bunk in bunkum" by clamoring for the head of the man higher up. A lower cost of food and a minimum amount of it that is tainted would do the average worker much more good than he could derive from the presence of a big man in a penitentiary. The grossly inefficient methods of distribution and delivery in the cities have increased as rapidly as the costs of the middle-men. And these costs, unlike railway freight charges, weigh heavily on the individual.

Closely related to the default mentioned in the preceding paragraph is the general uncleanness of food and water. Recently published statistics show that in 50 of the leading cities of Europe the cases of typhoid fever are only one-fifth as many as they are in the leading cities of the United States. In this country anybody has been pretty free to sell anything to anybody else in the way of dirty foods and dirty drinks. Investigations have shown that in many of the kitchens in the cities where food is prepared in large quantities care and cleanness are uncommon. Bread and other foodstuffs are handled and delivered without being wrapped. Formerly Chicago followed the example of the pious Hindoo, who lives where cholera begins, and drank the water from its wash basin and drainage system. Later it constructed a drainage canal and poured its sewage into it; and the cities along the Mississippi complained that it thus kept up to a degree the Saxon practice described by Macaulay of throwing slops and uncleanness out of the windows and into the streets, perchance upon the heads of passers-by. Meantime our legislators have been thundering about railway over-capitalization that cannot be proved and denouncing the lowest freight rates in the world.

Nor have legislators given relief from the injustice of our so-called "system" of taxation. The burden upon the poor householder and the large corporation is very heavy, while it is relatively light on many that are competent to pay. A good sidestepper need pay nothing. But of course there is nothing political to be lost by "soaking" the small taxpayer; there is spectacularity and popularity to be gained by going after the common carrier; and there is some risk in going after the big local business man.

* * *

The law writers say that as the power to tax is the power to destroy, it should be exercised only to the least degree necessary to support the government. But the question with the modern statesman is not where it *should* be exercised, but where it *can* be; and all the inventive genius of the Yankee has been exercised in devising new ways to lay taxes. In several instances the rivalry of publicans in different states to collect an inheritance tax on the property left by a man has portended that one of these times the corpse will be stripped of its cerement. Everybody is paying more taxes than he ever did before, and yet the Taft administration had to invent the corporation earnings tax to get the country out of the hole into which the Roosevelt reign had put it.

Where does all this money go? There is probably not a city in the country of over 100,000 population with adequate schoolhouse facilities. We do not pay our teachers reasonably, and have often been twitted by foreigners with being the only people in the world that let out the education of their children to the lowest bidders. We don't pay our judges adequately. The management of almost any public institution affords material for a scandal on any dull day that a newspaper wants to look in. We don't enforce our laws against crime. What becomes of all the money raised by taxes? The constant increase of taxes, like the constant hammering of freight rates, does not seem to produce results. Should not actual law be brought up more nearly to such needs of business? There would be no "bunk" in a genuine reform of taxation. Doubtless that is why the dull and difficult subject does not recommend itself to most legislators.

* * *

One of the results of our grossly inefficient government is that over 9,000 homicides are committed in this country in a year. Might not conditions be improved by regulating railway rates a little less and murder a little more? Another result of inefficient government—of the failure to pass and enforce good laws—is that almost 5,500 trespassers are killed on our railways annually. Is regulation to save the lives of passengers so much more important than regulation to save the lives of the fifteen times as many trespassers who are killed?

How much longer will it take the good people of this country to awaken to the fact that the need of the time is for putting more stress on the important and less on the relatively unimportant; that "bunkum" is not good government; that "bunk" is not the corner stone of good government; and that therefore "keeping the bunk in bunkum" is not the first duty of a statesman?

NEW BOOKS.

Regulation, Valuation and Depreciation of Public Utilities. By S. S. Wyer, consulting engineer, Columbus, Ohio. Published by the Sears & Simpson Co., 116 West Spring street, Columbus, Ohio. Flexible leather binding; India paper; 313 pages. Price, $5.

This book is a discussion and compilation of the pertinent, economic and legal facts relating to the valuation of public utilities. The book is intended not as an argument for or against valuation, but rather an attempt to establish a code for valuation. No attempt will be made here to discuss the author's theory of valuation, since it is sufficient to say that no two engineers agree exactly as to the details of the basis on which a valuation should be made. The book is well gotten up. It contains, besides 13 chapters on the general subject of valuation, two chapters giving engineering and reference data, and a sixteenth chapter containing a bibliography. The book has 47 illustrations.

Letters to the Editor.

ENTERPRISING STATION AGENTS.

QUEENSTOWN, Wis., March 20, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of February 21, page 334, in an article on "What Many Station Agents Miss," we are told in an interesting way how station agents could use their spare time to assist the company by getting new industries located at their stations; giving some instances of what had been accomplished in that line. The agent's time belongs to the company employing him and it is his duty to do all in his power to use his spare time outside of his regular duties to secure extra business.

There are two sides to this question. I prefer the station I am appointed to rather than the one I have worked up to a good business. It is one thing to get in new industries, but it is a decidedly different matter to take care of them after you get them into your town. I think that the main reason that more agents do not keep awake in that line is that the railway companies do not seem to realize that the increased business means increased work on the part of the agent. If some man before him has managed the station without the increased business, they will work the life out of him; and if he cannot do the work, after having been the means of getting the increased business, they will appreciate his work by removing him and getting someone else to take the position, at the same salary and no more help. My experience and observation have convinced me that this is the way it goes. Such an appreciation doesn't offer much inducement for a man to "let out his belt" and work hard.

I am telling you plain facts. It seems to me that in handling different men, each case should be considered in a class by itself, as much as possible. The straight edge of a rigid rule should not be applied to all cases indiscriminately. I believe that, if each case were considered on its own merits, far greater justice and efficiency would be accomplished. If a station is in real need of additional assistance, and does not get it, the surplus business will many times be lost or driven away through inattention or intentional neglect. It does not take much increase in earnings to pay another clerk's salary. M. L. D.

SUITABLE STUDIES FOR STATION AGENTS.

THREE LAKES, Wis., March 17, 1913.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Our modern magazines abound with advertisements of correspondence schools guaranteeing to teach everything from Law to Engineering, and from How to Sell Real Estate to How to Speak French. It has been my observation that railroad men, especially station and office men, are great consumers of these so called courses of instruction; and, while for one already somewhat acquainted with the subject which he essays to study they might be of some assistance, I believe that in the majority of cases they are soon dropped, leaving the purchaser out of pocket the amount he has paid, and his employer out the time and energy he has wasted on it.

It is my belief that most of the railroad employees taking up these courses do so, not because they really want to study law, banking, civil engineering, or the dozen and one things they take up, but simply because they are ambitious to fit themselves for a higher and more remunerative position; and the advertisement, with its alluring literature, is the only way they see open. If the railroads would make it possible for them to get in touch with good railroad literature, and books giving instruction on railroad matters they would not waste their money, nor their employers' time, on instructions pertaining to outside occupations; and both the company and the employee would be ahead.

I believe that if some department of the railway made it a

point to keep in touch with all books published pertaining to the railway business, reporting on each as to its merits; and to assist railway employees to any possible reduction in rates of subscription to the better class of railway magazines, such as the *Railway Age Gazette,* much good could be accomplished, and much assistance given to the rank and file of employees in gaining proficiency in their work.

D. E. Lamon,
Agent, Chicago & North Western Railway.

SLOVENLY WHISTLING.

Bradford, Pa., March 8, 1913.

To the Editor of the Railway Age Gazette:

While much has of late been written upon the very commendable "Safety-First Movement," I do not recall having read anything on one subject which might properly come under this head—that of the proper use of the locomotive whistle in conveying signals.

To illustrate, the book of rules prescribes two long followed by two short blasts of the whistle on approaching a road crossing. Stand for a couple of hours at a road crossing on some busy main line—or, better yet, at a place like Depew, N. Y., where the New York Central, the Lehigh, the Lackawanna and the Erie parallel each other within a comparatively short distance—and listen to all of the various interpretations of that rule. You hear two blasts followed by two shorter ones, all consuming from one to three seconds; and, all being quiet and weather conditions perfect, the whistle is heard; with conditions unfavorable it is not heard. Then there is the whistle blown with such poor spacing of the blasts that at a distance it may sound like one long and two short blasts, or like two long and one short. Next you may hear two reasonably long followed by two short blasts, all full, clear and nicely spaced. And so on; as each train comes along there is a different style to the signal, some good and some not.

This applies to other whistle signals as well. Several years ago while spending the night on a farm midway between Dunkirk and Brocton and about half a mile from the Lake Shore tracks I heard a limited train on that road whistle in a manner that sounded good. The two long blasts were each of about three seconds' duration, and the two short ones of about one and one-half seconds and about a two-second interval between the blasts. Have you heard the station whistle of one short blast of less than one second's duration? A blast of from five to ten seconds would have clearly advised the train crew as well as the agent at the station of the train's approach to the station, while it is extremely doubtful if the "less than a second" blast does.

I believe that more care should be exercised in handling the whistle than is now the general practice. The blasts should be sufficiently long and fully spaced to clearly, distinctly and definitely communicate the signal intended. While it may be technically complying with the law to blow the whistle any old way, yet equitably and ethically it is not a reasonable compliance unless the results for which the law is intended are fulfilled.

W. R. Shaw.

[We print this rather long letter because it brings up a subject to which more attention should be given. The title which we have put on the letter expresses an idea which must arise in the mind of the careful railroad officer very frequently on the great majority of roads. We have touched on this subject editorially now and then. The few superintendents who have responded to what we have said have reported their experiences in such a way as to indicate that most superintendents and trainmasters are too much engrossed, with matters deemed more important, to give more than occasional and superficial attention to this one. Our correspondent commends the artistic performance of the engineman of the Lake Shore Limited who cheered the farmers of the "grape belt" with a signal which aroused the echoes of the night for about 15 seconds. We can readily understand that in a lonely farm house, half way between Dunkirk and Brocton, especially if not situated too near the railway, one might be glad, in the silent watches of the night, to hear this evidence that the world was still alive; but, unfortunately for this innocent theory of life, there are thousands of people, all along the railroads of America, who make a very rational demand for less noise instead of more. It is not always easy to adjust the equities with precision, for where trains are very numerous the briefest whistle blasts become a nuisance by their frequency. The only reasonable rule, therefore, is to make every blast as short as is practicable. Two seconds is long enough for the highway crossing signal; three seconds should be called very long. To require every engineman to rightly proportion the length of all the sounds is the duty of every superintendent. In many situations it is a plain duty to the public not only to shorten blasts, but to use softer whistles.—Editor.]

SECTIONAL CROWN FIREBOX.

New York, March 11, 1913.

To the Editor of the Railway Age Gazette:

The article on "Impressions of Hungarian Railway Practice," by Henry W. Jacobs, in your issue of March 7, illustrates a firebox having a crown built up of channel sections and designated as the Polonco sectional crown firebox. The statement is made in a foot note that: "The first one was built 30 years ago by the late Herr Polonco, an Austrian engineer," from which the natural implication is that the design was originated by the party named.

As a matter of fact, it is that which has been applied to some extent in Europe, under the title of the "Polonceau firebox," having been patented by Monsieur Polonceau, a *French* engineer. (French patent No. 124,069, April 25, 1878.) It will be found illustrated in *Organ fur die Fortschritte des Eisenbahnwesens in Technicher Beziebung,* Band 16, 1879, Taf. III, Figs. 13 and 14, and in *La Chaudiere Locomotive et son Outillage,* by G. Richard, Paris, 1886, Figs. 24 to 27, and the following statement (literal translation) is made regarding it: "The entirely recent invention of M. Polonceau has not yet received the definitive sanction of a prolonged practice, but it seems difficult to foresee, for this logical simplification of the firebox of locomotives, anything other than a full success."

In both these publications, strips of metal are shown interposed between the channel sections. It is clear that Mr. Jacobs' informant has, doubtless inadvertently, misled him, and as to "Herr Polonco, an Austrian engineer," I think that "there never was no sich person."

However, this may be, the credit of originality of this design cannot be awarded to either Monsieur Polonceau or "Herr Polonco," nor was it first *built* by either of them, as will appear by reference to the illustrated article entitled "Locomotive Boiler, Designed by Joseph A. Miller, C. E., Boston, U. S.," in *The Engineer,* London, March 3, 1871, page 142, from which I make the following excerpt: "The boiler, illustrated in the accompanying engraving, unites two of Mr. Miller's patents, each of which has been tested by practice. Fig. 1 is a longitudinal section of a locomotive boiler, 15 ft. long with 4 ft. 6 in. barrel. . . . The crown chest (sic) is made up of flanged sections 6 in. wide and 6 in. deep. They are arched, and besides having great strength, Mr. Miller claims that they conduct heat into the water." See also *Eisenbahnwesen,* Band 8, 1871, Taf. K, Fig. 15.

Another application of the same principle is shown in the U. S. patent of H. S. Bryan, No. 198,342, dated December 18, 1877, the channel sections being, in this case, disposed longitudinally, instead of transversely, as in the Miller and Polonceau designs, and it has been carried to its logical development in the Jacobs-Shupert firebox, in which the roof or wrapper is similarly built up of channels, connected to those of the crown by interposing stay sheets.

J. Snowden Bell.

BALDWIN LOCOMOTIVES BUILT DURING 1912.*

Tendencies in Design and Construction of Freight and Passenger Power as Shown by a Survey of Last Year's Output.

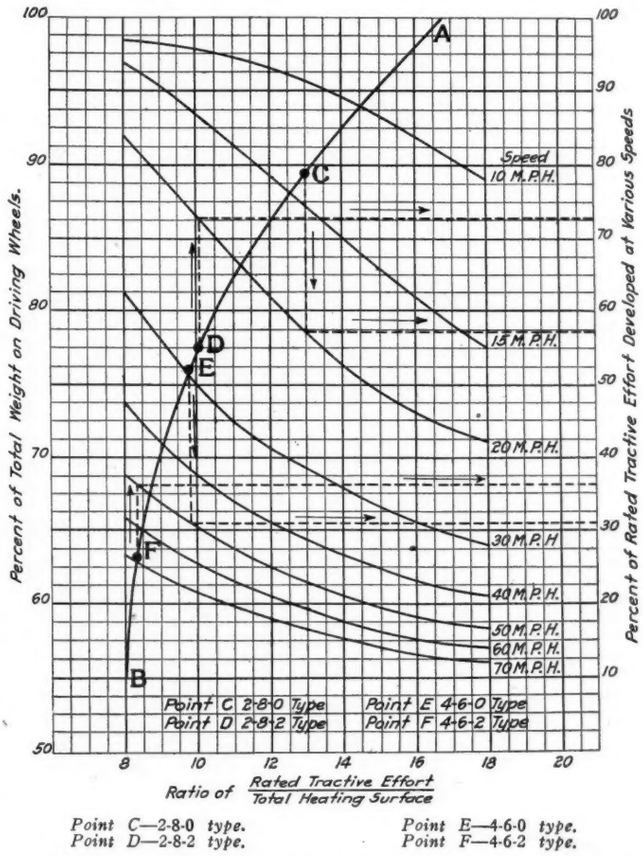
Locomotive development is influenced principally by traffic requirements, and the locomotives built during 1912 clearly illustrate the fact. Increasing train weights, the need for higher operating efficiency, and more stringent regulations with a view to promoting safety in travel, all combined to influence the types of locomotives placed in service. To meet these conditions has required locomotives of increased average weight and a more general adoption of such fuel saving devices as superheaters and brick arches. As a result, the increase in weight and nominal capacity has been accompanied by an increase in efficiency, rendering the locomotives more reliable in service and reducing the amount of double heading formerly required in order to maintain difficult schedules. The observance of stringent speed regulations at curves, junctions and other points where accidents are specially liable to occur, has contributed to the necessity for using locomotives of improved efficiency, capable of maintaining schedules without running at excessive maximum speeds.

FREIGHT LOCOMOTIVES.

In studying the product of The Baldwin Locomotive Works for the year, the most conspicuous feature, as far as freight locomotives are concerned, is the development of the non-articulated locomotive. Comparatively few heavy consolidation locomotives were built, practically all the eight-coupled engines for through traffic on trunk line railways being of the Mikado type. The principal superiority of the latter over the consolidation type lies in its increased relative steaming capacity, as illustrated in the accompanying diagram. The line *AB* shows the average relation between the percentage of total weight on driving-wheels and the ratio of rated tractive effort to heating surface for a large number of locomotives of different types. It is evident that the lower the value of this ratio, the greater will be the steaming capacity in proportion to the tractive effort developed. The point *C* indicates an average value for locomotives of the consolidation type, and the point *D* for locomotives of the Mikado type. The transverse lines indicate the percentage of the rated tractive effort developed at various speeds by locomotives having different relative steaming capacities. These percentages are read on the right hand side of the diagram. At a speed of 20 miles an hour, for example, the consolidation locomotive develops 57 per cent. of its rated tractive effort, while the Mikado develops 72 per cent. This illustrates a fundamental difference between the two types. The Mikado is further favored because of its larger firebox volume, which is a feature of special value when burning high volatile coal. Locomotives of this type are making excellent records in heavy, slow-speed service and also in fast freight service where high horse-powers must be developed. Under favorable conditions, such locomotives, equipped with superheaters, are hauling 30 per cent. more tonnage than the saturated steam consolidation type engines formerly used in the same service, with no increase in actual coal consumption.

The following table contains the leading dimensions of nine heavy Mikado type locomotives built during the year.

Two designs of the Santa Fe, or 2-10-2 type, locomotives were built during 1912, one for the Chicago, Burlington & Quincy and the other for Atchison, Topeka & Santa Fe. . The Burlington locomotives, as far as tractive capacity is concerned, are the most powerful non-articulated locomotives thus far produced. The tractive effort developed is 71,500 lbs., and the average weight per pair of driving-wheels is slightly in excess of 60,000 lbs. This design is a logical development of the Mikado, in that the firebox is placed back of the driving-wheels. The neccssary con-



Point C—2-8-0 type. *Point E—4-6-0 type.*
Point D—2-8-2 type. *Point F—4-6-2 type.*

Relation Between Percentage of Total Weight on Drivers, Relative Steaming Capacity, and Tractive Effort at Various Speeds.

sequence is a long boiler barrel; but a combustion chamber is used, and the length of the tubes is 22 ft. 7½ ins., which is not abnormal. These locomotives are equipped with automatic

*The following locomotives built by the Baldwin Locomotive Works were described and illustrated in the *Railway Age Gazette* during 1912: January-June—Erie, 2-8-2 type, Page 241; Chicago, Burlington & Quincy, 2-10-2 type, Page 1006. July-December—Virginian, 2-8-2 type, Page 20; Chicago, Rock Island & Pacific, 2-8-2 type, Page 352; Great Northern, Mallet type, Page 572; Chicago, Burlington & Quincy, 2-8-2 type, Page 1045.

HEAVY MIKADO LOCOMOTIVES.

Road.	Cylinders, In.	Drivers, In.	Steam Pressure. Lbs.	Grate Area, Sq. Ft.	Water Evaporating Surface, Sq. Ft.	Superheating Surface, Sq. Ft.	Weight, Total Engine, Lbs.	Weight on Drivers, Lbs.	Tractive Effort, Lbs.
Wabash	25 x 30	64	200	63	4,473	...	262,700	202,800	49,800
Union Pacific	23¾ x 30	57	180	73.5	4,181	895	265,700	206,500	45,500
Chicago Great Western	27 x 30	63	185	70	4,105	880	283,100	217,900	54,800
Illinois Central	27 x 30	63	175	70	4,100	886	280,000	217,000	51,700
Baltimore & Ohio	26 x 32	64	190	70	3,968	833	276,000	219,000	54,500
Woodward Iron Company	24½ x 30	55	200	75	6,036	...	285,000	220,000	55,000
Virginian	26 x 32	56	185	57	4,359	910	297,500	229,600	60,800
Chicago, Burlington & Quincy	28 x 32	64	180	78	4,627	961	303,400	231,000	60,000
Chicago, Rock Island & Pacific	28 x 30	63	180	63	4,264	905	318,850	243,200	57,100

stokers and Emerson superheaters. With driving-wheels 60 in. in diameter, it is impossible to put the necessary amount of counterbalance in the main wheel centers, and two cast steel counterweights are accordingly mounted on the main axle between the frames. In this way a satisfactory arrangement of counterbalance is secured. Five of these locomotives were built for handling heavy coal traffic in Illinois. In many respects the Mikado type locomotives previously referred to, are similar to them; and interchangeable details have been used where practicable.

The locomotives for the Atchison, Topeka & Santa Fe, of which 20 were built, are lighter than the Burlington engines, and are a development of the 2-10-2 type locomotives built for this road during the years 1903-1907. These engines used saturated steam in tandem compound cylinders, whereas the new ones use superheated steam in single expansion cylinders. The superheaters are of the Schmidt type, and the locomotives use oil for fuel. In this design the firebox is placed above the rear pair of driving wheels, and the rear truck is of more value as a means of guiding the locomotive when running backwards, than for providing increased boiler capacity. The principal dimensions of the Santa Fe and Burlington locomotives are given in the following table:

MALLET LOCOMOTIVES.

Road.	Cylinders, In.	Drivers, In.	Steam Pressure, Lbs.	Grate Area, Sq. Ft.	Water Evaporating Surface, Sq. Ft.	Superheating Surface, Sq. Ft.	Total Weight, Engine, Lbs.	Weight on Drivers, Lbs.	Tractive Effort, Lbs.	Wheel Arrangement.
Missouri, Oklahoma & Gulf	21 & 32 x 30	55	210	53.4	3,407	685	315,800	277,100	60,800	2-6-6-2
Pennsylvania	25 & 39 x 30	56	205	78	4,936	1,020	408,700	408,700	82,000	0-8-8-0
St. Louis, Iron Mtn. & Southern	26 & 40 x 32	55	200	84	5,763	890	435,000	395,000	94,500	2-8-8-2
Southern Pacific	26 & 40 x 30	57	200	68.4	5,626	900	436,200	400,900	85,500	2-8-8-2
Great Northern	28 & 42 x 32	63	210	78.4	6,446	1,368	450,000	420,000	100,000	2-8-8-0

A notable order for Mallet locomotives was filled for the Great Northern, which received 25 engines of the 2-8-8-0 type. These exert a tractive effort of 100,000 lbs. working compound, and are fitted with Emerson superheaters. A device is used, controlled by a hand-wheel and screw, for changing the cut-off in the low pressure cylinders independently of the high pressure. With this arrangement the power developed in the front and back engines may be equalized when running at various speeds. Seventeen of these locomotives are coal burners, while the remaining 8 use oil for fuel. All have boilers of the Belpaire type, with tubes 24 ft. long and combustion chambers 58 ins. long.

The Southern Pacific received 15 Mallets of the 2-8-8-2 type. These are oil burners, and in their general features follow the well-known design first introduced in 1909 on the Central Pacific. The separable boiler with feed-water heater is retained in the new locomotives, but the smokebox reheater is omitted and a Schmidt superheater applied. The superheater is placed in the chamber between the feed-water heater and the boiler proper. This places the header close to the high-pressure cylinders, and the superheater steam pipes are so short that there is but little opportunity for the steam to lose its heat. These locomotives are arranged to run with the cab end leading.

A Mallet locomotive of the 0-8-8-0 type, specially adapted to pushing service, was built for the Pennsylvania. It has a boiler of the Belpaire type, with tubes 23 ft. long, and is fitted with a Schmidt superheater. Another locomotive for special service, with the 2-8-8-2 wheel arrangement, was built for the St. Louis, Iron Mountain & Southern. It is intended for the heaviest class of hump-yard service and is fitted with a separable boiler, feed-water heater and Schmidt superheater. The starting-valve is of the type used on Baldwin two-cylinder compound locomotives, and allows steam to pass direct to the high pressure cylinders at starting, and subsequently changes the engine to work compound entirely.

Five Mallet locomotives for heavy, slow-speed road service were built for the Missouri, Oklahoma & Gulf. These operate on 70-lb. rails, and have a hauling capacity of 3,000 tons on a grade of 0.6 per cent. They are fitted with Schmidt superheaters, and illustrate the suitability of the Mallet type for heavy service on comparatively light tracks.

In all these locomotives special attention has been given to simplifying the arrangement of the steam piping as far as possible, and to providing ample strength in the structural parts. Cast steel has been used to excellent advantage. The high-pressure cylinder saddle is formed with a suitable cavity in which the ball-joint of the receiver pipe is seated. The center line of the ball-joint coincides with that of the articulated frame connection. With this arrangement there are no variations in the length of the pipe when the locomotive is traversing curves. The table above shows the principal dimensions of the Mallet locomotives referred to.

PASSENGER LOCOMOTIVES.

All the locomotives for through passenger service built during the year were six-coupled, the Pacific type predominating. No engines of the Atlantic type were constructed. Traffic requirements today frequently necessitate hauling passenger trains weighing from 600 to 800 tons, and wheel load limitations are such that if double-heading is to be avoided, six-coupled locomotives must be used. With large driving-wheels and high steaming capacity Pacific type locomotives are suitable for high speed service; and some very fine work has been placed to their credit. Superheaters have been applied to the majority of locomotives of this type built during 1912.

SANTA FE TYPE LOCOMOTIVE.

Road.	Cylinders, In.	Drivers, In.	Steam Pressure. Lbs.	Grate Area, Sq. Ft.	Water Evaporating Surface, Sq. Ft.	Superheating Surface, Sq. Ft.	Weight, Total Engine, Lbs.	Weight on Drivers, Lbs.	Tractive Effort, Lbs.
Atchison, Topeka & Santa Fe	28 x 32	57	170	58.5	4,367	910	295,900	248,900	63,800
Chicago, Burlington & Quincy	30 x 32	60	175	88	5,161	970	378,700	301,800	71,500

Referring again to the diagram, the point *E* has been plotted on the line *AB* for the ten-wheel type, and the point *F* for the Pacific type. It is seen that at a speed of 50 miles an hour, the ten-wheel type develops 31 per cent. of its rated tractive effort, and the Pacific type 36 per cent. This represents an advantage for the latter type, of nearly 12 per cent. Individual cases may be found in which the advantage is materially greater than this, because there are many locomotives in successful service whose proportions differ materially from those indicated by the line *AB*.

The table on the following page contains the principal data of nine recent Pacific type locomotives. The locomotive for the Seaboard Air Line, with 63-in. wheels, is specially designed for freight service; and engines of this type, with wheels of moderate diameter, may often be used with equally satisfactory results in either fast freight or heavy passenger service.

The locomotives for the Santa Fe are of the balanced compound type. All the main-rods are connected to the second pair of driving-wheels, and the inside (high-pressure) cylinders are inclined, so that their rods pass above the first driving axle. These locomotives are fitted with Schmidt superheaters, and represent the highest development of the balanced compound as

used on the Santa Fe. With extensive experience acquired in the operation of balanced compound locomotives of the Atlantic, Pacific and Prairie types, the builders and the railway company, acting conjointly, were in a position to design a particularly satisfactory locomotive, eliminating such features as had proved unsuitable in previous engines.

The locomotives for the Central of Georgia are notable in that they are fitted with the Gaines firebox. In this design a furnace of exceptional length is employed, and the front part is utilized as a combustion chamber. A thorough mixing of the gases is effected by a baffle wall, which separates the combustion chamber from the firebox proper. Provision is made for admitting a supply of pre-heated air in a rearward direction, at the top of the wall. In the new Pacific type locomotives, this furnace is used in combination with a Schmidt superheater. Service tests with the Gaines firebox have shown not only material economy in fuel consumption, but also exceptional freedom from leaky tubes and steam failures.

A novelty in the product of the Baldwin Works for 1912 is a geared locomotive for logging service. The first locomotive of this type was placed in heavy switching service at the Eddystone plant, where its performance has been most satisfactory. This engine is carried on two four-wheel trucks, with all the wheels connected as drivers. It is symmetrical in construction, with a central drive to all the axles. The gears run in cast-steel housings, which are kept filled with lubricant so that they require a minimum amount of attention. As far as possible, this engine follows existing locomotive practice in its design; while at the same time, its flexibility permits it to operate over tracks so rough as to be unsuitable for direct connected locomotives.

The locomotives built during 1912 have been notable because of the special attention given to details of design, with a view to improving efficiency and eliminating engine failures as far as possible. This is most noticeable in such parts as the valve motion, frames and frame braces; and in the application, to large locomotives of special equipment such as power operated grate shakers, fire door openers and reverse gears. The Ragonnet reverse gear is now being applied, not only to Mallet locomotives, but to a large number of engines of other types. Not the least important feature of this gear is that the mechanism in the cab takes up very little room—a special advantage on large locomotives where the space available is often so limited that it is difficult to arrange the cab fittings in a convenient manner.

Pressed steel domes, made from a single plate, have been used on a large number of locomotives recently built, and are proving highly satisfactory. These domes can be made in diameters up to 33 in. and in heights up to 26 in. They are simple in construction, have ample strength, and the sizes are so standardized as to require a minimum number of dies for their production. In many boilers the auxiliary dome is now located in front of the firebox, and is placed over an opening in the shell of sufficient size to enable a man to enter. The interior of the boiler can thus be inspected without dismantling the fittings in the main dome.

Interchangeability of locomotive details has been carefully studied during the past year, and several examples of locomotives having a large percentage of interchangeable parts have been built. The Mikado and Pacific types offer exceptionally good opportunities in this respect. Under favorable conditions, they may be designed with interchangeable cylinders and boilers; and such features as driving and truck boxes, stub brasses, axles, and a large number of fittings, can be made alike in the two classes. This was conspicuously carried out in the case of four Pacific and eight Mikado type locomotives which were built for the New Orleans, Mobile & Chicago. Practically all the parts of these locomotives subject to wear, except the driving tires and a few smaller details, are interchangeable. The engines weigh less than 200,000 lbs. each, and are not included in the tables.

From present indications, a further increase in the capacity of existing types of locomotives may be effected only by increasing wheel-loads beyond the maximum limits now permitted. The application of fuel-saving devices, more careful attention to the design of details, and the building of locomotives specially suited to meet definite operating conditions, have all combined to materially improve efficiency. The result of this policy has been most gratifying, and its continuance may be expected; but time alone can tell what new locomotive types will be evolved, when traffic requirements necessitate motive power units of materially greater capacity than the largest now in service.

PACIFIC TYPE LOCOMOTIVE.

Road.	Cylinders, In.	Drivers, In.	Steam Pressure, Lbs.	Grate Area, Sq. Ft.	Water Evaporating Surface, Sq. Ft.	Superheating Surface, Sq. Ft.	Weight, Total Engine, Lbs.	Weight on Drivers, Lbs.	Tractive Effort, Lbs.
Seaboard Air Line	23 x 28	71	185	53.1	2,794	575	211,600	133,900	32,800
Seaboard Air Line	22 x 28	63	180	53.1	2,794	575	218,350	139,150	32,800
Southern Pacific	22 x 28	77	200	49.5	2,658	580	221,100	141,500	30,000
Central of Georgia	23 x 28	69	180	58.3	2,689	605	222,300	134,850	32,800
Atlantic Coast Line	22 x 28	72	200	54.2	2,917	590	225,900	139,800	32,000
Southern	24 x 28	72½	185	54	3,058	660	233,000	142,300	35,000
Wabash	24 x 26	74	200	63	4,473	...	245,950	158,450	34,400
Atchison, Topeka & Santa Fe	17½ & 29 x 28	73	210	73	3,443	619	268,800	163,500	33,400
N. Y. Central & Hudson River	23½ x 26	79	200	56.5	3,427	803	269,350	171,300	30,900

REPORT ON GLEN LOCH DERAILMENT.

The derailment of passenger train No. 19, at Glen Loch, Pa., on the Pennsylvania Railroad, November 27 last, was reported in the *Railway Age Gazette* December 6 and 13, pages 1086 and 1137. The train was derailed by the failure of a bridge, and 4 persons were killed. The report of the Interstate Commerce Commission, just issued, gives the causes of the bridge failure as embraced in the conclusions of H. W. Belnap, chief inspector, and James E. Howard, engineer. From this report we quote:

Examination of the bridge after the derailment showed that the cover plate of the most northerly column had broken parallel with the south edge of the column, allowing the box girder to settle 16 or 18 inches upon the column. This in turn allowed the rails of track No. 4, on which train No. 19 was running, to settle under the train, causing the derailment. This break probably occurred under the engines of train No. 19. In the middle of the bridge there were flange marks on the south side of both rails. One rail very much bent, was nearly opposite column No. 8, where the depression in the track was the greatest at the time of the derailment. The depression of the box girder measured about 18 in. over this column, while over column No. 7 it was much less, being only a few inches. The greatest lateral displacement of the bridge also occurred in the vicinity of column No. 8 and the bent rail. It is believed that when the engines were suddenly raised out of the depression into which they had dropped, the flanges of the derailed wheels cleared the top of the south rail.

Mr. Howard in his report states that the initial line of rupture appears to have been the completion of a fracture which existed prior to the accident. The cover plate had previously been ruptured through the greater part of its thickness, which was ¾ in. The initial crack extended from the outer surface downward to a depth of about ⅝ in., leaving about ⅛ in. sound metal. The completion of this line of rupture was the immediate cause of the accident.

It would seem that the cover plate of column No. 8 had been repeatedly subjected to bending stresses both from the downward weight of the trains and from their outward centrifugal

thrust, and that some looseness had permitted of a hammering action of the south web of the box girder upon the cover plate, all of which had resulted in the development of a progressive or detailed fracture. With such a fracture started it was only a question of time when rupture of the plate would be completed and the failure of the bridge consummated.

The formation of a progressive fracture is the result of occasional overloads repeated a greater or less number of times according to their magnitude. If the overload reached a maximum at each application rupture would soon take place, but such is not usually the case under service conditions. Doubtless it was an exceptional incident in the history of this bridge when all the conditions of loading conspired toward developing a maximum stress. In the interval of time since the bridge was built there has been a decided increase in the weights of rolling stock and concentrated loads on wheels, and higher stresses no doubt have been received by the bridge in recent years over those of former ones.

The length of time during which this fracture has been in existence cannot be told. As a matter of judgment it may have been in process of development for a number of years. It could hardly have been developed, however, to any great extent four years ago, the last time the bridge was painted, since paint had not run into the crack. It is not believed to have had its origin within a period of a few months.

During the formation and development of the rupture it would have been visible so far as being covered by any other part of the structure was concerned, but its accessibility for inspection or detection would have been impaired by the double latticing of the vertical webs of the box girders.

On this division of the Pennsylvania Railroad there are from 500 to 600 bridges to be inspected monthly, and the force doing this work consists of six inspectors. In the testimony taken at the investigation conducted by the railroad it was shown that the master carpenter, who has charge of the inspectors, knew prior to the accident that some of the anchor bolts of the main girders were disturbed, and both he and the track foreman were of the opinion that the bolts at the east end of plate girder B were broken off down in the stonework of the abutment.

The bent anchor bolts at three of the corners of the bridge would suggest the kind of forces which were acting to strain the structure, and that the freedom of the floor beams to be moved laterally on the east abutment by centrifugal force [of trains passing rapidly over the 2° curve] leading to the bending of the cover plate, might reasonably have attracted attention. Again, the signs of hammering of the south web of the box girder on the cover plate would suggest that looseness existed prior to the accident. It is believed that these forces led up to the rupture of the cover plate.

To guard against the recurrence of such accidents as this and that at Manchester, N. Y., in August, 1911, examination should be made of all bridges for the purpose of determining whether or not any of their structural members are exposed to overstraining loads under present increased weights of equipment.

FROM THE ENGINEER'S REPORT.

This bridge, No. 43½, was of iron, built in 1891. It is a skew bridge on an angle of about 15 deg. There are two spans of half-through plate girders. The main plate girders were anchored to the abutments by means of two 1⅛ in. bolts at each corner, eight bolts in all. Expansion was provided for at the west end of the bridge. Each main girder was provided with gusset braces, five each for girders designated by the letters A, B, and D, and six for girder C.

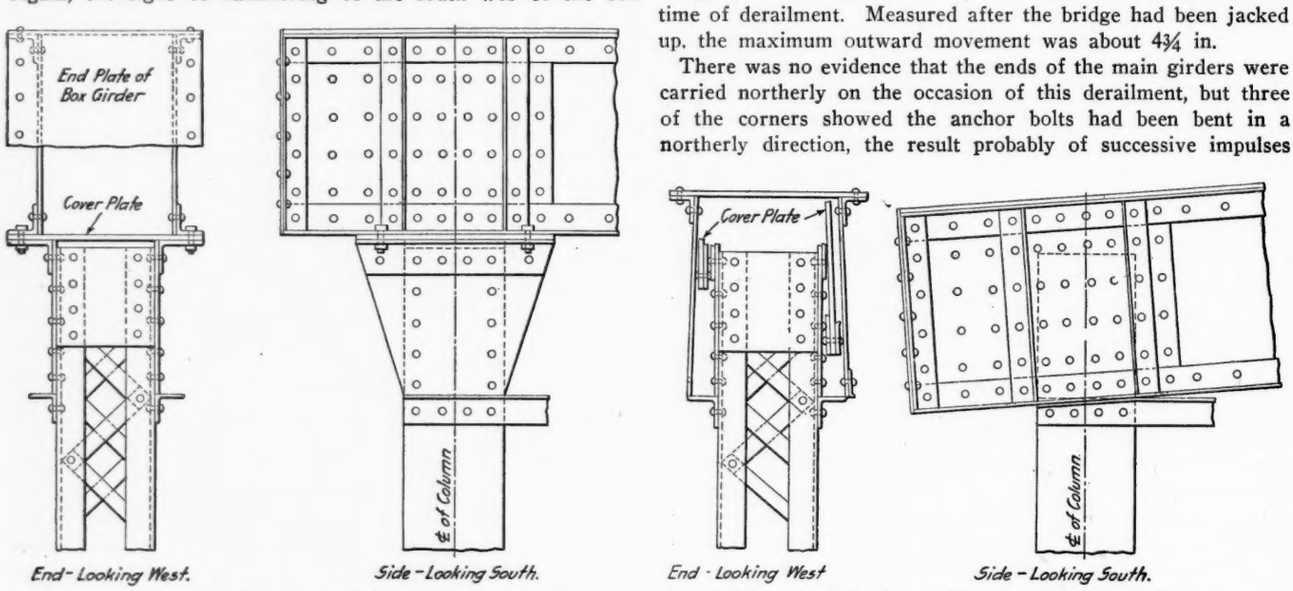
The floor beams, 15 in. I beams, were at their outer ends in part riveted to the webs of the main girders, those, however, which reached to the abutments rested upon the masonry without attachment thereto. Shoes 8 x 10 in. of 2¾ in. plates were riveted to the lower flanges of the I beams and rested directly upon the abutment walls. The inner ends of the floor beams were bolted to the box girder.

Concerning the derailment, the most easterly marks on the ties were found on the bridge about 66 ft. west of the east end of girder B and abreast column No. 8. They were located on the north side of the north rail of track No. 4; that is, the track on which train No. 19 was running. These first marks on the ties were not numerous nor were they very deep. Since the derailed wheels of the two locomotives were found on the opposite side of the rails—that is, on the inside of the curve—it is believed that these most easterly marks represent a secondary occurrence and not a primary one.

Only one rail on the bridge was so bent as to require to be replaced by a new one when the line was reopened for traffic. The steel inner guard rails and the wooden outer ones kept the train in good condition until it cleared the bridge. The bridge ties were bunched but little. They were moved an inch or two.

The shoes of the floor beams had apparently worn smooth seats on the masonry of the east abutment, from which it appears that the frictional resistance of the beams at their ends resting upon the abutment wall was of uncertain value in resisting centrifugal forces during the passage of trains at high rates of speed. The floor beams moved on the east abutment at the time of derailment. Measured after the bridge had been jacked up, the maximum outward movement was about 4¾ in.

There was no evidence that the ends of the main girders were carried northerly on the occasion of this derailment, but three of the corners showed the anchor bolts had been bent in a northerly direction, the result probably of successive impulses



Details of Post No. 8, Bridge No. 43½, Pennsylvania Railroad, Glen Loch, Pa.

received during the period of time in which the bridge had been in service.

The bolts of the west girder on the north side were partially withdrawn from the stonework. At the southwest corner of the bridge the bolts of the girder were not disturbed. This corner would not be called upon to resist centrifugal forces of trains rounding the curve at speed, on account of the reaction of the west abutment.

. . . The cover plate prior to the disaster was ruptured through the greater part of its thickness.* There was a bending moment at the top of column No. 8, which put the upper surface of this cover plate into tension. From outside to outside of the gusset plates the column measured 13 in., while the box girder which it supported measured 16¼ in. from inside to inside of its web plates, an overhang of 1⅝ in. on a side. There was evidence of looseness at the joint between the cover plate and the web member of the box girder, at least at the south web, which was the ruptured edge of the cover. Repeated hammering of the web plate had indented and slightly grooved the upper surface of the cover plate.

These conditions are believed to have started a progressive fracture in the cover plate, which was promoted by a deficiency in lateral stability of the bridge along its easterly half. Trains passing over the bridge at high rates of speed would tend to move it outward and exert an overturning tendency on column No. 8, such as it might be, while the floor beams would necessarily deflect under the weight of the train and further intensify the stress transmitted through the south web of the box girder. The load transmitted to column No. 8 by the main girder would still further cause this to be a highly stressed member, and tend to rupture the cover plate. In addition the grain of the iron of the cover plate ran lengthwise the box girder, which caused the bending stress on the plate to be crosswise the grain—that is, it was stressed in its weakest direction.

The tendency of the bridge to shift its position in a northerly direction under the influence of the centrifugal forces of the trains is shown by the bent condition of the anchor bolts at three of its corners. The supporting columns of the box girder could easily be overturned by an outward thrust on the track. These columns were tied together in pairs by braces, but such bracing was not in the direction which would materially increase the stability of the bridge. The easterly end of the bridge was retained on its abutment chiefly by the resistance of the anchor bolts at the ends of the main girders, while they were bent in offering such resistance. Attending these conditions it would seem that the cover plate of column No. 8 had been repeatedly subjected to bending stresses, both from the downward weight of the trains and from their outward centrifugal thrust, and that some looseness had permitted of a hammering action of the south web of the box girder upon the cover plate, all of which had resulted in the development of a progressive or detailed fracture. With such a fracture started it was only a question of time when rupture of the plate would be completed and the failure of the bridge consummated.

It appears that the master carpenter was cognizant of the fact that certain of the anchor bolts of the main girders had been disturbed and that both he and the track foreman were of opinion that the bolts at the east end of plate girder B were broken off down in the stonework of the abutment.

This bridge had evidently been inspected at frequent intervals, none of which had disclosed the presence of a detail or progressive fracture in the fatal cover plate.

The deflection of a girder depends upon the modulus of elasticity of the material which goes to make up the girder. That value appears to remain constant in a given structural member, unless there is a very decided overstrain, one in fact which would occasion such deformation as would throw the structure out of service. Over-straining would need to be quite general to produce an observable effect on the deflection of a girder of this type, by reason of the lowering of the value of the modulus of elasticity of the iron. But the lowering of the modulus of elasticity by overstrain is not a permanent effect. The metal recovers its normal value within a few days or weeks, as shown by laboratory tests, hence such indications would be effaced within a short time, and as applied to the deflection of a girder the test might be considered as lacking in exactness. . . . Bridge No. 43½ was certainly a very much inspected structure, but as the result has shown it was not saved from a disastrous failure. Reliance appears to have been confined to inspection for a period of 21 years to furnish assurance of the safety of this bridge for constantly increasing traffic and heavier rolling stock than in use at the time of its construction. No evidence has been presented to show that any critical examination of the plans of the bridge made during that interim led to the discovery of defects in the structure which the wreck of train No. 19 clearly brought into prominence, details which are recognized as undesirable as they are now seen. In the fatal cover plate an unsatisfactory detail is recognized. The discovery or recognition of such a defective detail might properly have been expected of the custodians of the plans of the bridge. The Pennsylvania Railroad has from time to time had occasion to renew its earlier bridges and replace them with stronger structures. Such renewals may have been in part the result of inspection reports on their condition, but generally from engineering knowledge that the working loads were approaching too high limits.

It is obviously futile to look for reliable indications of impending rupture in the results of tests for deflection under passing trains. A more refined and careful analysis of the condition is needed to be serviceable to judge of the approach of danger. . . . The design of the bridge prevented disclosure of the fracture "under the usual inspection." It was inaccessible but in a comparative sense only, that is, as respecting the usual inspection. The cover plate was a short one and easily reached for painting. The double latticing of the box girder prevented direct visual inspection of the plate along its most strained section, which part otherwise was exposed to full view.

Portable apparatus for the inspection of inaccessible surfaces has been in use for many years in other lines of inspection service, consisting merely of a mirror, with a lamp for illumination. It would doubtless be an innovation to introduce such an apparatus in bridge inspection, but in a case like the present one it is a question whether the most vital part of the structure shall go uninspected because the inspector cannot get his head into position to view the critical part or to employ the necessary means to view the same. Vital parts, demanding careful inspection, should be pointed out to the bridge inspectors by the bridge engineers, since the latter have the plans at hand and opportunity to judge by computation what parts are most strained, according to the design of the structure.

The freedom of the floor beams to move laterally on the east abutment in response to centrifugal forces and leading to the bending of the cover plate of the end column under the box girder might reasonably have attracted attention.

The grain of the cover plate was parallel to the length of the box girder, thus straining the iron crosswise the grain. The tensile tests showed low results, only 29,950 pounds per square inch, in that direction, with the elastic limit and tensile strength nearly coinciding. While iron plates would not be expected to be used in the direction found here, there was no assurance that such would not be the case, and both ruptured covers of columns Nos. 7 and 8 were so oriented so that the bending stresses strained the metal in its weakest direction.

Latticed column No. 8, made of 12-inch channels, 83.7 pounds per yard, should have an ultimate compressive strength of about 500,000 pounds total. The strength of the cover plate, unassisted by the 4 by 6-inch angles, assuming a maximum fiber stress of 30,000 pounds per square inch, would be 83,000 pounds total. The angles no doubt re-enforced the cover plate, still leaving, it is believed, a great disparity in strength of this detail over the strength in the body of the column.

*We reproduce the drawings, showing the behavior of this cover plate, which were given with our report of December 13.—EDITOR.

ECONOMICAL LIMITS OF GRADE REDUCTION.

Discussion of the Factors Entering into an Analysis of Train Resistances and Their Respective Importance.

By Walter Loring Webb,
Consulting Engineer.

Within the past few years several railroads have adopted ruling grades on certain divisions far lower than would have been dreamed of 50 years ago, at least when the cost of obtaining such low grades is considered. Many thousands of miles of railroads in this country have been located on the basis of maximum grades approximating 60 ft. per mile, with six-deg. curves as the maximum. Recently a realization of the economy of low ruling grades has impelled trunk lines to make large expenditures to reduce these grades, where physically or financially possible, from 1.2 per cent. down to 0.5 per cent., 0.4 per cent., and even 0.3 per cent., and within the past year announcement has been made that the Erie is excavating an average of over 150,000 cu. yds. per mile near Meadville, Pa., in order to establish a 0.2 per cent. grade. About two years ago, President Willard of the Baltimore & Ohio, ordered a maximum grade of 0.2 per cent. established on second track work in Indiana and Ohio.

In constructing a second track along the Mississippi River, between Savanna, Ill., and St. Paul, the Chicago, Burlington & Quincy adopted a 0.2 per cent. grade. Even when these divisions were "river roads," it required a much larger expenditure for grading to obtain these rates of grade than would have been required to make more undulating profiles. The question naturally arises, is there any limitation below which there is no justification for spending any money to reduce the grade, assuming that the traffic is so large that the necessary cost is not in itself a limitation?

It should be clearly understood that this subject is here considered wholly apart from the special question of whether the traffic is or is not sufficient to justify the expenditure, in any particular case, of a certain computed sum. The question is a general one and only refers to whether there is some limitation beyond which the advantage of grade reduction ceases, and therefore does not justify additional expenditure, no matter how small, or how enormous the traffic which may be affected thereby.

The fundamental distinction between ruling and minor grades should be kept in mind. A minor grade adds a small percentage to the consumption of fuel and other engine supplies and an almost inappreciable amount to the expenses of maintenance of way and rolling stock. On the other hand, a ruling grade limits the number of cars which may be hauled by a locomotive. With a reasonably large freight traffic, an increase in the number of cars per train will mean a reduction in the number of trains necessary to handle a certain gross tonnage. Since the revenue received on that gross tonnage is a fixed quantity, a reduction of grade, which will permit that tonnage to be hauled by a less number of trains, will permit a reduction in operating expenses which is largely clear profit. As a general proposition, the very great economy resulting from a reduction of the ruling grade does not need argument. It is only when there is a possibility of reducing a very low ruling grade to a grade still lower, and at a very large expenditure, that the economical justification becomes questionable.

ANALYSIS OF TRAIN RESISTANCES.

The investigation of this subject must evidently include an analysis of all train resistances, the ratio that grade resistance on various grades bears to the total resistance and the economy which would result from reducing the total resistance by a computed proportion. To compare two operating conditions, we may compute the total resistance in pounds per ton under each condition. Any reduction which may be made in the resistance, measured in pounds per ton, and including every form of tax on the power of the locomotive, means a possible increase in the train load which can be hauled by a locomotive of given type, and from this may be computed the possible saving in the number of trains required to handle a given traffic. For the purpose of this discussion the total demand on the locomotive may be divided into four divisions; grade resistance; inertia resistance; the extra tractive resistances which only occur when starting and at very low velocities, and all other resistances.

Grade resistance on a majority of roads is so great that it swallows up and overshadows the others, and yet it is the one form of resistance which may be indefinitely reduced and possibly made zero, provided enough money is spent to accomplish it. It is also exactly computable to the last ounce. It equals 20 lbs. per short ton for each per cent. of grade. For the 1.2 per cent. grade, which was formerly so general as a maximum grade and even now is so common, it is 24 lbs. per ton, while for the 0.2 per cent. limit, referred to above, it is only 4 lbs. per ton.

Inertia resistance is also mathematically computable. The amount of the resistance is controllable and is purely a matter for the operating department. When the elevated roads in New York City were operated by steam locomotives, it was estimated that three-fourths of the fuel consumption was due to this cause. The necessity for a reasonably high average speed between termini, combined with stops every few hundred feet, required abnormal accelerating power. The work of acceleration, using all the power of the locomotive, would be frequently continued to a point at which deceleration would be commenced in order to make a proper service stop at the next station. Of course such a combination of conditions is not applicable to most steam roads, and least of all to through freight traffic. Therefore, this form of resistance is not usually a controlling factor, but it will be shown later that when other forms of resistance have been eliminated as far as possible, operating conditions may require a degree of acceleration which makes its demand on the locomotive a controlling element in the magnitude of the train load. The required accelerative force may be expressed by the formula:

$$P = 70.2\ (V_2^2) - V_1^2 \div s,$$

in which V_2 and V_1 are the higher and lower velocities, respectively in miles per hour, s is the distance in feet and P is the required constant accelerative force in pounds per ton. When the train starts from rest, $V_1 = 0$. A few numerical illustrations will readily show what this force amounts to. If a train must acquire a velocity of 20 miles per hour in a distance of 1,000 ft. and starting from rest,

$$P = 70.2\ (400 - 0) \div 1{,}000 = 28.08 \text{ lbs. per ton.}$$

This is equivalent to the grade resistance on a 1.4 per cent. grade. If the velocity must increase from 20 to 40 miles per hour in the next 1,000 ft., the required force will be

$$P = 70.2\ (1{,}600 - 400) \div 1{,}000 = 84 \text{ lbs. per ton.}$$

This is the equivalent of a 4.2 per cent. grade. Working the problem backward, to find the required distance in which the accelerative force of 28.08 lbs. per ton would increase the speed from 20 to 40 miles per hour, we would have

$$s = 70.2\ (1{,}600 - 400) \div 28.08 = 3{,}000 \text{ ft.}$$

Of course the accelerative force is independent of the other forces, and any change in the other tractive forces due to change in velocity is assumed to be otherwise taken care of.

As before stated, the amount of the inertia resistance or accelerative force is under the control of the operating department. It may be made indefinitely small by adopting a very low rate

of acceleration, but of course this is not economical, since time is wasted on the road. On the other hand, a quick acceleration cannot be accomplished without a very great reduction from the train load, which might be handled with slow acceleration. A uniform accelerative force of 5 lbs. per ton (beside the force required for other resistances) will produce a velocity of 8.4 miles per hour in the first 1,000 ft., 11.9 miles per hour in the second 1,000 ft., 14.6 in the third, and 16.9 in a total of 4,000 ft. For comparative purposes we will use 5 lbs. per ton accelerative force later on.

The extra resistances which only occur when starting or at very low velocities are here given special prominence because, in the minds of some, their unavoidable occurrence constitutes a limitation on the economical reduction of ruling grade. This extra resistance is most readily observed when a number of freight cars are started up after remaining at rest for a long period in freezing weather. On the other hand, such a high resistance is only momentary and is very quickly reduced to a much lower quantity. During some careful tests on the Rock Island system to determine this resistance, a maximum of 30 lbs. per ton was found for a train which had stood over night and was "frozen up." The weighted mean of 35 tests with trains of 34 to 45 cars showed an average resistance of 14.1 lbs. per ton, with a minimum of 6 lbs. per ton when the stop was only instantaneous. Considering that these figures *include* the regular tractive resistances, which must be considered as 5 to 8 lbs. per ton, depending on the condition of the track, proportion of dead load to live load, and many other causes of variation, we must only consider the *excess* over 5 to 8 lbs. as the amount chargeable to starting. When an engineman finds that his locomotive is unable to start his train in the usual way, he frequently backs the engine for a few feet and then, reversing, starts ahead, and frequently succeeds in starting the whole train. By this method he accomplishes three things; the journals are loosened from their rigid condition and the initial high resistance is greatly reduced; the coupler springs are compressed and their expansion during the following forward movement materially assists in starting the train; and the total coupler compression in a long train is so great that the engine moves forward several feet before the last car starts. The cars are started one by one. The last effect will alone reduce the required draw bar pull by nearly 50 per cent.; the first two effects are not so readily computable, but are evidently of considerable influence. By such practical operating methods the extra resistance during starting, apart from inertia, grade, and the ordinary tractive resistance, may be reduced to a relatively small although somewhat indefinite quantity.

The other tractive resistances, which, for the purpose of this discussion, may be lumped together, are dependent on ratio of dead load to live load, on the number of cars, on the condition of track and weight of rail and on velocity. Since the limitations of ruling grade apply first to freight traffic with comparatively slow speed, and since the variations of resistance for variations in velocity between 5 and 35 miles per hour are so small that they may be here ignored, we need not complicate the discussion on account of variations in velocity. Since the tractive resistance per ton is less for fully loaded cars and since train loads of fully loaded cars are the critical loads to be here considered, we may assume that all of these ordinary tractive resistances may be lumped at 5 lbs. per ton.

The resistance due to curvature may be here ignored on the assumption that the grades on all curves are compensated. On the basis of 0.035 per cent. per degree of curve, even a 0.2 per cent. grade is nearly sufficient to compensate a 6 deg. curve. Any road spending large sums to reduce grade to 0.2 per cent. would certainly reduce 6 deg. curves to something easier, and we may therefore consider that curve compensation is always practicable and that it is done. Of course curve compensation does not eliminate curve resistance, but whenever curve compensation has been accomplished, curve resistance has been eliminated as a possible factor in limiting the weight of trains.

If we assume that all of these resistances occur simultaneously, and that the rate of acceleration is the same for either grade, we would have, for a 0.4 per cent. grade, a total resistance of 5 + 5 + 8 or 18 lbs. per ton, and for a 0.2 per cent. grade, 5 + 5 + 4 or 14 lbs. per ton, with a small addition in each case for the extra resistances when starting. The inverted ratio of these two figures will be a measure, although not in strict proportion of the relative train loads which can be hauled by a locomotive of a given type on the two ruling grades. For our present purpose it is unnecessary to determine mathematically the relative cost of handling traffic on the two grades. It is unquestionable that the economy of operating the lighter grade is very great, even though the reduction in operating expenses is not measured by the 22 per cent. reduction in resistance per ton. It is likewise true that, no matter what variations may be made in the rate of acceleration demanded, nor in the tractive resistances caused by the particular condition of track and roadbed, the relative value of the two grades will not be radically changed when the resistances other than grade are the same. And there seems to be no escape from the necessity of considering that all of these resistances may happen simultaneously provided that regular stopping places, passing sidings, block signals, or even grade crossings, which may require a stop almost anywhere, are located without regard to the grades of the road. This proviso may be inverted by saying—provided that the grades are designed without regard to the places where regular or occasional stops must be made. The designers of elevated railroads have already utilized the advantages of locating stations on a hump, artificially made so by increasing slightly the height of a few columns near the station. Incoming trains transform their kinetic energy into potential energy and thus save in the use of brakes. Departing trains utilize that potential energy to reduce the demand on the locomotive to provide the accelerative energy when starting. The saving is thus two-fold.

When grades have been so reduced that there is a question whether the ruling grade should be 0.4 per cent. or still further reduced to 0.2 per cent., it requires but little change in the grading to create a hump which will more than make up this difference at some regular stopping place or even at a block signal where a train is liable to be held up. A hump 4 ft. high and running out for 2,000 ft. in either direction will change the grade 0.2 per cent. This four-foot hump will consume the kinetic energy of a train moving at a velocity of 10.7 miles per hour, and therefore a train approaching this hump at a velocity somewhat in excess of this need not be stalled. If the train must stop at the summit of the hump, brake action is saved, with the attendant saving of wear on wheel treads and brake shoes. In addition there is the assistance of a virtual 0.2 per cent. down grade, or 4 lbs. per ton when starting. This gain of 4 lbs. per ton will exist irrespective of the actual grade, for the grade on the farther side of the hump will always is 0.2 per cent. more favorable to traffic than the original grade on which the hump is placed.

If a road could be so constructed that all stopping places were on a level; that the level stretches were long enough so that a train could acquire its normal velocity; and that stops would never be required on the ruling grades; there might be justification for a claim that there would be no advantage in anything less than a 0.4 per cent. ruling grade. Under these conditions the only resistances on the grade would be the ordinary tractive resistances and the grade resistance of 8 lbs. per ton. When starting on the level, there is no grade resistance and the 8 lbs. per ton may be used up in the extra resistances during starting and in acceleration. However, a railway manager would not dare to load up a locomotive to the limit suggested by such figures, for there would be no margin left if an unexpected stop should be necessary on the ruling grade, and if the train

load is cut down to the capacity of the locomotive to start from rest on the ruling grade, then we have the simultaneous combination of all the four classes of resistances, and, as previously pointed out, the reduction of one of these resistances will make a definite and sure reduction in the total resistance and will surely justify a profitable increase in the train load.

Expensive reductions in ruling grade are almost invariably accompanied by a reduction of curvature down to a limit of 3 deg., 2 deg. and even 1 deg. curves. The justification of such reduction is a very different matter from the reduction of the rate of grade. The curvature does not limit the length of trains and cannot therefore have the same importance as ruling grade. It does add something to the resistance, but since this has been determined as the equivalent resistance of 0.035 per cent. grade for each degree of curve, even this is of comparatively slight importance. The real justification for such curve reduction is the safe operation of fast trains. Any railroad having such a traffic that 0.2 per cent. grades can be considered as a maximum, will also wish to operate fast trains, say at 60 miles per hour. The proper super-elevation of the outer rail for even a 2 deg. 30 min. curve, operated at 60 miles per hour, is six inches. Running a train at 60 miles per hour with the track superelevated six inches certainly requires good track construction and good rolling stock and even then its safety is perhaps questionable. A slow order on all curves sharper than 2 deg. 30 min. is therefore imperative for all trains which are to be operated at a speed of 60 miles per hour or faster. Since the engineman's schedule of many of the fast trains of the country include many stretches over which a speed of 60, 65, and even 70 miles per hour must be maintained, it is plain why all projects for grade reduction also include curve reduction, but it should be remembered that the justification has an entirely different basis.

LOCOMOTIVE LABORATORY AT THE UNIVERSITY OF ILLINOIS.*

By Edward C. Schmidt,
Professor of Railway Engineering, University of Illinois.

An accurate knowledge of locomotive performance is as necessary to the railway operating officer and to the locating engineer as to the locomotive designer, and in periods of rapid progress in locomotive development the need of such knowledge becomes the more urgent. In the beginning, such effort had for its chief purpose the improvement of the mechanical features of locomotive design rather than improvement in its economical performance; but in later years, under the demand for decreased operating costs, this effort has been directed chiefly toward developing accurate information about the performance of the locomotive boiler and engines and of the machine as a whole.

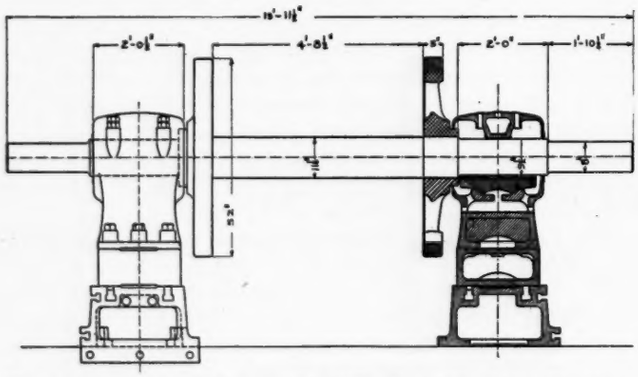


Fig. 1—One Pair of Supporting Wheels, with Axle, Bearings and Bed Plate.

*Abstract of a paper presented before the Western Railway Club, March 18, 1913.

Until about twenty years ago the only other source of accurate and specific information concerning locomotive performance was the data derived from specially arranged road tests. For certain purposes they will never be displaced. The usefulness of road tests is, however, limited by the fact that on the road many of the conditions of operation are entirely beyond control; and consequently even the most skillfully and conscientiously conducted road tests sometimes fail to produce conclusive evidence.

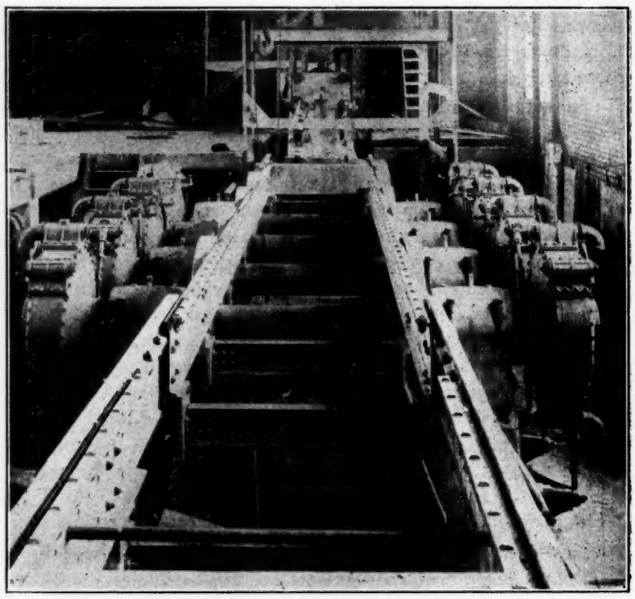


Fig. 2—Rear End of Testing Pit Arranged for a Consolidation Locomotive.

The first locomotive testing plant was built 21 years ago at Purdue University. It was designed by Dr. W. F. M. Goss, who was at that time in charge of the schools of engineering at that institution. At present there are four such testing plants in this country and two in Europe.† The justification for the existence of locomotive testing plants lies in the fact that in them only

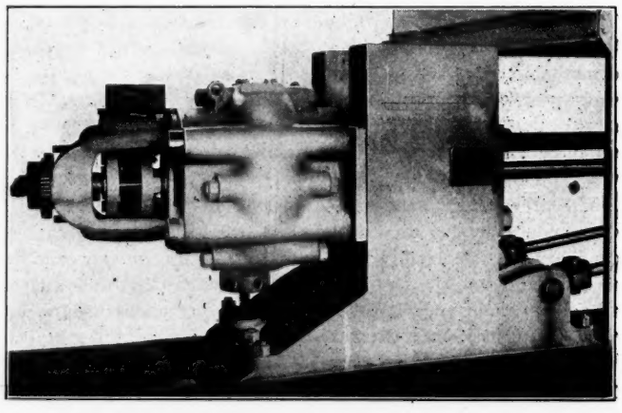


Fig. 3—Weighing Head and Housing of Dynamometer.

†The Purdue plant, erected in 1891, was followed in 1894 by a temporary plant at South Kaukauma, Wisconsin, on the Chicago & North Western, designed under the direction of Robert Quayle. This was succeeded in 1895 by a permanent plant, designed by Mr. Quayle and erected at the C. & N. W. shops in Chicago. In 1899 Columbia University, having been given an Atlantic type locomotive by the Baldwin Locomotive Works, provided a testing plant which is erected in their mechanical engineering laboratory. In 1904 the Pennsylvania Railroad installed at the Louisiana Purchase Exposition at St. Louis, what was at that time the largest and most elaborate plant built. This was removed after the exposition to Altoona, Pa., where it has since been in almost constant operation. In 1904 there was also erected in the Putiloff Works at St. Petersburg, Russia, a similar plant designed by Messrs. M. V. Goloboloff and S. T. Smirnoff. The following year there was erected in England another plant under the direction of G. J. Churchard of the Great Western Railroad, at the Swindon Works of that company.

can the locomotive be run under conditions which may be rigidly controlled and varied at will. It is also true that in the test plant the difficulty and expense of making tests are both greatly reduced; but this in itself is less important than the control of the operating conditions which test plant service puts in the hand of the experimenter. As a consequence of this control practically all questions relating to boiler performance can be better and more easily settled in the testing plant than on the road and the same is equally true of questions touching engine performance. Supplemented occasionally by road tests made by means of a dynamometer car, the locomotive testing plant makes possible a knowledge of locomotive performance as exact as that which is available concerning the stationary steam engine, the turbine, and the gas engine.

At its last session, the legislature of Illinois included among its appropriations for the University of Illinois the sum of $200,000 to be used for new buildings for the College of Engineering. It was decided to use this fund in erecting a transportation building and a locomotive laboratory for the department of railway engineering.

Any locomotive laboratory consists essentially of, first, a means for so supporting the locomotive that its wheels may be rotated and that the power developed may be absorbed and either dissipated or transferred; second, a means for anchoring the locomotive when so mounted and for measuring the tractive effort developed; third, means for supplying and measuring coal and water; and finally, means for disposing of the gases and steam from the front end.

The supporting mechanism consists in this plant, as in all others, of wheels whose position may be varied to conform to the spacing of the locomotive's driving wheels. In this case the supporting wheels are 52 in. in diameter, provided with plain tires and mounted on 11⅛ in. axles. The axles and tires are of the highest grade of heat-treated carbon steel and were furnished by the Midvale Steel Company. The use of 52 in. supporting wheels involves rotating speeds as high as 500 r. p. m. in testing high speed locomotives. Such speeds may give rise to difficulty in the operation of the bearings, although they have been designed with regard thereto. In anticipation of such difficulty, however, provision has been made (in the design of the bearing pedestal) for using 72 in. diameter supporting wheels, if it later proves desirable to do so. The axles are supported at each end, just beyond the wheels, in bearings 9½ in. by 20 in. which are provided on the under side of the journal only. These bearings are carried in self-aligning shells which are supported in pedestals of exceedingly heavy construction. Oil is provided at two points in the bearing cap, where it is supplied under head from an elevated supply tank. The bearing pedestals rest on massive cast iron bed plates which run the entire length of the testing pit, and are secured thereto by the bolts whose heads are held in slots running the length of the bed. The pedestals may therefore be shifted to any desired position on the bed. The general design of the axle, wheels, bearings and bed plate is well represented in Fig. 1. Each of these units, consisting of an axle, two wheels, and two bearings, constitutes the supporting element for one pair of locomotive drivers. So supported, the driving wheels may turn; and there remains to be provided a means for absorbing the power developed at the driving wheel rim.

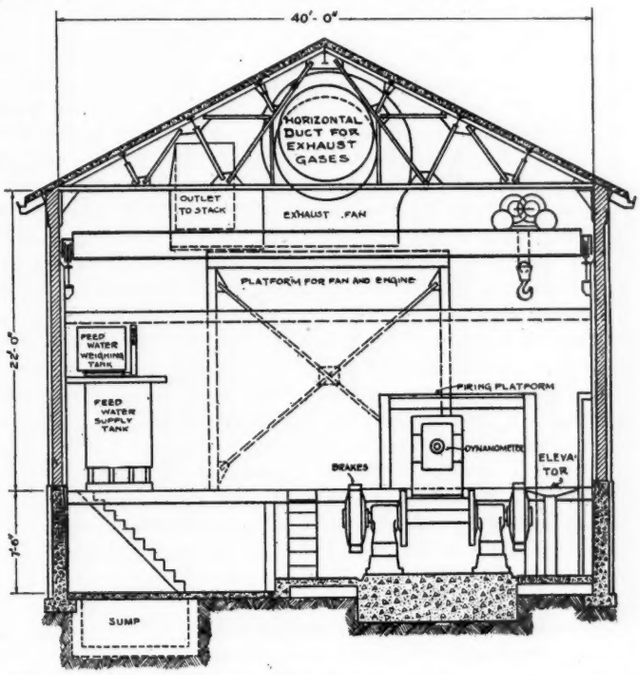


Fig. 5—Cross-Section Through Middle of the Locomotive Testing Plant.

The brakes are of the type used in all other American testing plants, and were designed and furnished by Professor G. I. Alden of Worcester, Mass., under general specifications prepared by the designer of the plant. One of these brakes is mounted on each end of each supporting axle. Each brake consists essentially of three cast iron discs which are keyed to the supporting axle, and which rotate between water cooled copper diaphragms carried in a stationary casing. A cast hub and the three discs form an integral rotating element which is keyed to the axle and turns with it. The casing and its diaphragms are prevented from rotating by means of links attached to the bed plates,

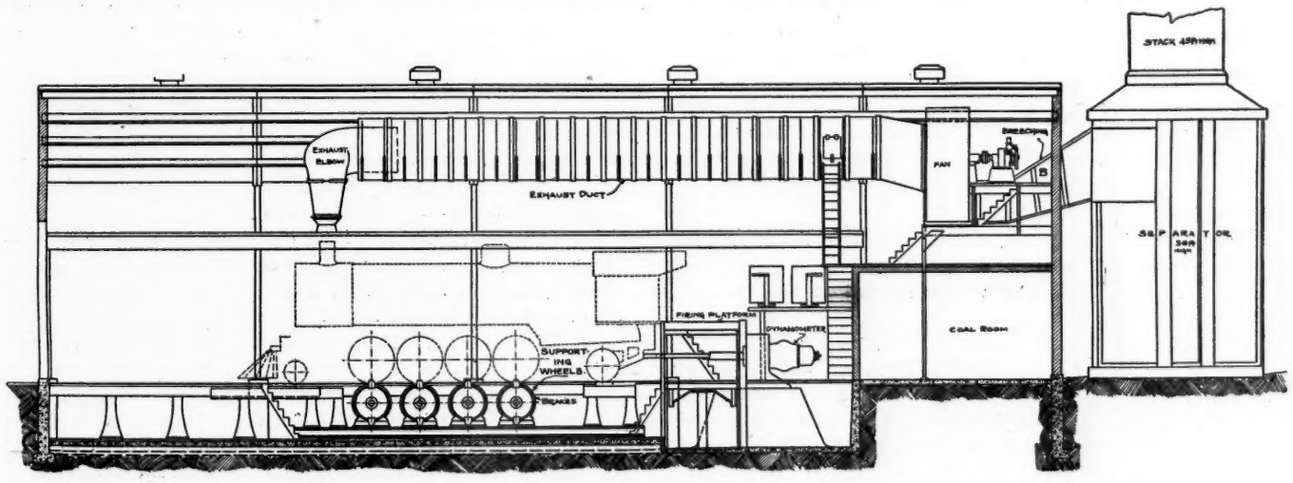


Fig. 4—Longitudinal Section Through the Locomotive Testing Laboratory.

The diaphragms provide within the casing three compartments within which the cast iron discs rotate. The surfaces of the discs and of the diaphragms are lubricated by oil fed in at the periphery of the discs and taken off at the hub. The diaphragms form also within the casing four water compartments which have no communication whatever with the compartments within which the discs rotate. The pressure existing in these water spaces may be varied at will by means of suitable valves in the brake piping. The operation of the brakes is as follows: Power received from the driving wheels of the locomotive is transmitted through the supporting wheels and axle to the cast iron brake discs; these in turn transmit it by friction to the surfaces of the copper diaphragms against which they rub. By varying the water pressure, the friction between the discs and the diaphragms may be varied in accordance with the amount of power to be absorbed. The entire power of the locomotive is thus dissipated at the surface of the diaphragms and carried away as heat in the water which circulates through the brakes. Each brake is designed to develop a resisting torque of 18,000 lbs.-ft., which is more than is likely to be transmitted to it by the most heavily loaded locomotive driver.

The foundation of the plant is a slab of reinforced concrete 93 ft. long and 12 ft. wide, varying in thickness from 3½ ft. at the front to 5 ft. at the rear. It is surmounted at the rear end by a pyramidal base which serves as the anchorage for the dynamometer. The mounting machinery thus far described is shown in Fig. 2 arranged for the reception of a consolidation locomotive. The locomotive to be tested is backed on to the machine; the drivers run on their flanges leaving the treads free to engage the supporting wheels. When the drivers are properly placed and the locomotive is securely anchored to the dynamometer, the track is removed.

The dynamometer, whose chief function is to permit the tractive effort of the locomotive to be measured, is shown in Fig. 3. It is of the well known Emery type, designed and built by the William Sellers Company of Philadelphia. It consists essentially of the "weighing head" shown at the left, carried on the housing, and of a weighing scale not included in the picture. Within this weighing head is an enclosed oil chamber with a flexible wall, which receives and balances any force transmitted from the locomotive. The pressure of the oil in this chamber varies with the load and is transmitted through a copper tube of small bore to a similar smaller oil chamber, the pressure within which moves the beam of a substantial but very sensitive scale. The force transmitted to the dynamometer is thus weighed. Its capacity is 125,000 lbs., which is 15,000 lbs. greater than the tractive effort of any locomotive in existence. One feature of special interest in the design of the scale lies in the fact that the adjustment of the poise weight on the scale beam is accomplished automatically.

Other details include the weighing tanks, hydraulic elevator (for lifting the coal from the floor to the firing platform), scales, coal room, and firing platform. The general water supply of the university is from driven wells, the demand upon which approaches at times their full capacity. No other source of cooling water for the brakes is available. Water from the brakes could not therefore be wasted, and provision has been made for cooling and recirculating it. A supply pump for the brakes draws water from a reinforced concrete reservoir of 100,000 gal., pumps it through control valves to the brakes, whence it returns through another set of control valves to a sump located in the basement of the laboratory. Another pump returns it from here to the reservoir. The feed water is drawn from this reservoir by a separate pump, passed to the weighing tanks and feed tank and thence to the injectors. This feed water, of course, is wasted and must be restored to the reservoir between tests by drawing on the general university supply.

In the design of the means for disposing of the exhaust gases new problems were presented and new solutions have been reached. In view of the importance of determining accurately the total fuel lost in the exhaust gases, it was early decided to try to incorporate in the design of this plant some means for entrapping *all* of the solid matter contained in the gases passing the locomotive front end. The exhaust gases are discharged into a steel exhaust elbow which carries the gases up and over to the center of the building, where they are received in a horizontal duct running through the center of the roof trusses. The gases are drawn through this elbow and duct by an exhaust fan, located near the roof at the rear end of the building. Probably the heaviest cinders will be dropped in this duct, but the velocity within it is such that all but the heaviest particles of solid matter will be carried on through the fan. Whatever does accumulate here may be removed through traps provided in the bottom of the duct, and weighed. From the fan, the gases and the remaining solid matter are passed through a breeching or flue to a separator in which they pass downward around a sleeve, where they are given a whirling motion which causes the cinders to move toward the wall along which they drop to a hopper below, while the gases pass downward and out to the stack through the mouth of the sleeve. The cinders collecting at the bottom of the hopper are drawn off and weighed. This separator is surmounted by a 45 ft. radial brick stack from which the gases are finally discharged 81 ft. from the ground.

The corrosive nature of the mixture of exhaust gas and steam has made it necessary to avoid the use of metal throughout this exhaust system. The exhaust elbow within the building necessarily has been made of steel, and will need occasionally to be renewed. The duct, however, is of asbestos board (Transite) which will resist corrosion. It is 7 ft. in diameter, and made up of separate sections so that its length may be varied. The fan has a runner 6 ft. in diameter, and will pass, at maximum speed, 140,000 cu. ft. of gas per minute. The breeching between fan and separator is built of transite, and has a minimum cross sectional area of about 24 sq. ft. The outer shell of the separator is built of reinforced concrete. To protect the shell from corrosion, it is lined throughout with a hard burnt red brick. Between this lining and the shell is a 2 in. air space to act as an insulator to protect the shell from undue heating. Any leakage of gas through the lining into this space is vented to the outside air through openings which are provided in the shell, and which serve also to circulate cool air through the air space. The inside sleeve and hopper are both built of reinforced concrete. The stack itself is unlined, but is laid up in acid proof cement. It is expected that this whole system will not only permit the collection of all solid matter and thus enable front end losses to be determined in a manner beyond criticism; but that it will also dispose of the smoke so that it will be unobjectionable and at the same time act as a muffler and eliminate objectionable noise from the locomotive stack discharge.

The building which houses this equipment is 40 ft. wide and 115 ft. long, with a height under the roof trusses of 22 ft. A basement with a 6 ft. 9 in. clear depth extends throughout all but 22 ft. of its entire length. The construction is fireproof throughout. The walls are laid up both inside and out with red faced brick, the roof is of reinforced concrete covered with slate, and all floors are of reinforced concrete also. The building is unusually well lighted by windows in the side walls which extend nearly the full height of these walls and occupy almost two-thirds of the wall area. All portions of the building, except the space occupied by the coal room in the west end, are served by a 10-ton traveling crane.

The whole plant has been designed with the intention of making it suitable to test new designs as they appear, in the confidence that the railroads and builders would be willing to keep upon the plant locomotives of recent design, concerning whose performance all railroad officials desire information. The first locomotive to be tested is one of the consolidation type owned by the Illinois Central Railroad.

REGULATION OF UTILITIES BY COMMISSION.*

Principles That Should Be Applied and Methods Used in Dealing with Service, Rates and Financial Return.

By Halford Erickson,
Member of the Wisconsin Railroad Commission.

The earlier systems of regulation were in the latter part of the eighteenth century superseded by the well known *laissez faire* policy under which competition was mainly relied upon for the establishment of fair prices and adequate service. While the policy is well adapted to the subduing of the forest and the prairie, it does not seem to be well fitted for the regulation of public utilities. It has, in fact, been found to be entirely inadequate for the proper regulation of the prices and other conditions of such services. And this fact has in turn led to a well-developed sentiment in favor of abandoning the competitive policy in the public utility field and to substituting therefor government regulation. In fact, in America and England the competitive or let alone policy has never been fully adopted for such facilities as water or canal transportation, toll bridges and turnpikes.

This demand and need for the return to government regulation of industries and services that are fraught with public interest has grown very rapidly during the past fifty years or more and this development has been brought about by the great changes that have taken place in economic and social conditions.

REGULATION OF SERVICE.

As the services rendered by public utilities are necessities, it is of great importance that they should be adequate or up to a reasonable standard. Poor service is uneconomical, irritating and a fruitful source of dissatisfaction and complaint. It is often responsible for the greater part of the ill feeling between the public and the utility, that exists in so many places. Such service, however, can as a rule be furnished at lower cost to the utility than good service, and it is in this fact that the incentive to poor service is found. To furnish inadequate service, especially when the rates charged are high enough to cover the cost of adequate service, is an unjust imposition upon the public. For the consumers are as much entitled to get what they pay for as the utilities are in charging reasonable rates for adequate service.

In the railway field, service questions involve the regularity and speed of trains, connections at junction points, the stoppage of a sufficient number of trains at the smaller stations, the proper care and maintenance of both trains and stations, the prompt and equitable distribution of cars among shippers, the equipment of the line with approved signaling and safety devices, and many other every day matters connected with the operation of trains. Under this head, also, though less directly connected with the comfort and safety of the users of railway service, is the proper protection of highway crossings, and the elimination of grade crossings. Not only are such matters as these investigated when brought to the attention of the commission by complaints and accidents, but the initiative is taken to a considerable extent by the commission itself, by means of frequent inspections by its experts of roadways, bridges, rolling stock, stations and yards, etc. Unless the defects of service are so intolerable as to make an order for their elimination almost a matter of course, the determination of railway service matters involves the consideration of a large number of questions. Where train or station service is being investigated, the population to be served, the amount of business likely to arise from the improved service, the operating difficulties involved, the actual cash outlay required in making the improvement, and many similar facts are to be considered. The maintenance of passenger train schedules which will enable the railway company to meet competition between its terminals may have a bearing on the propriety of requiring the regular stoppage of a train. Another service matter which is the subject of commission supervisions is the construction of spur tracks for the accommodation of industries along railway lines. The Wisconsin law on this subject requires the commission, on application, to order the construction of such spur track not more than three miles in length, when its construction is found to be practically indispensable to the business of the applicant, and is not unreasonably dangerous to the general public.

VALUATION AND REGULATION OF RATES.

With respect to rates our experience varies. In many cases the rates have been found to be unreasonably high as well as unjustly discriminatory. In other instances again, though less frequently, the rates have been found to be unreasonably low. Rates that are thus too high and that under similar conditions are higher for some persons and localities than for others are harmful and against public policy. They result in unequal distribution of wealth. They mean that money is unjustly transferred from one set of pockets to another set of pockets, and that a few are enriched at the expense of the many. They retard industrial development and commercial growth, and, in the same line of business, tend to build up some at the expense of others. They also lead to results that are bad, from a rural and ethical point of view.

Rates that are too low may also be harmful. They usually stand for poor equipment and poor service. When so low as not to provide means for the proper upkeep of the plant they may even lead to the entire ruin or loss of the service. Instances where conditions of this kind prevail are met with from time to time. They are detrimental not only to those who are directly affected, but to the public as a whole. Losses from poor service may be as great as losses from rates that are too high or discriminatory.

The law provides that the rates must be reasonable. The courts have held, in substance, that under normal conditions of a plant when taken as a whole, the rates in order to be reasonable should be high enough so that the revenues therefrom are sufficient to cover reasonable amounts for the operating expenses of a plant, including depreciation thereon and interest and profit on the fair value of the property used and useful for the convenience of the public.

The sum of the operating expenses and fixed charges is thus made the legal basis for rates. The first problem of the rate maker therefore consists of determining what constitutes reasonable amounts for these expenses and charges.

The first step that is necessary in the determination of such rates is to find the fair value of the property upon which the investors are entitled to interest and profit. In this determination one is at the very outset met with conflicting opinions of all kinds, not only as to what should be included in the term "property," but as to what is meant by "fair value." Some insist that the term property includes only the physical property that is used and useful in serving the public. Others again hold that besides the physical property it also includes the cost of developing the business. There are some who argue that the fair value is represented by the original cost, and others again that it is represented by the cost of reproduction at the time of the appraisal. A careful analysis of the facts indicates that the cost of both the physical property and of the business should be

*Abstract of a paper read before the Western Society of Engineers, Chicago, March 24, entitled "The Regulation of Public Utilities in Wisconsin." Mr. Erickson's discussion dealt with regulation of public utilities in general. The abstract here presented is confined chiefly to those parts of the paper dealing with regulation of railroads.

included in the appraisal, and that the original cost as well as the cost of reproduction not only of the physical property, but of the business as well, constitute evidence of value.

The original cost of the physical property includes the cost of all the land, labor, material and equipment of all kinds that are required in order to obtain a complete plant ready for operation. It also covers such overhead charges in connection therewith as organization, legal expenses, engineering and superintendence of construction, insurance and contingencies of all kinds, interest during construction period on the capital used, etc. When a plant is needed and cannot be had on better terms, the original cost may also have to include something for discounts on bonds and for promoters' expenses. In fact, the original cost of the physical property should include all necessary expenditures that were judiciously made in obtaining the plant. Before it can be effectively and economically operated, such a plant must also be provided with a working capital.

The true original cost is difficult to determine. The probable and reasonable cost, however, is not inaccessible, for many items can be closely estimated from the facts obtained from examinations of the present plant, its design, location, growth, character, size, the prices of labor, material and other elements which prevailed when built, and comparisons with similar plants of which the cost is known. Thus in the end a very close approximation of the actual cost of the physical property of the plant can ordinarily be obtained.

The next measure of value is obtained by determining what it would cost to reproduce the plant rather than by what the plant actually cost. In thus determining the cost of reproduction new of the plant, it is necessary to obtain complete inventories of every element that enters into such cost, as well as detailed statements of the prices at which these elements can be had, installed and shaped into an operating plant. The prices so used are the results of most careful and extended studies and compilations of market quotations and of prices at which sales were actually made. In order to avoid the abnormal effects of sudden fluctuations in such prices and to obtain results that are more nearly normal, the prices chosen may be said to represent average conditions for a considerable period, rather than the prices as of any particular date. When the elements which are thus included in the cost cover such overhead expenses as those incurred for organization, for legal and engineering service, for superintendence of construction, for interest and the capital used in construction, for insurance and contingencies, then this cost would seem to fairly represent what the plant would actually have cost. In this case, as in determining the original cost, it may be necessary at times to also consider certain bond discounts and promotion expenses in arriving at the probable total cost of reproducing the plant.

Neither the original nor the reproduction cost new of a plant is a fair measure of its present cost value unless the depreciation that has taken place in the plant has been provided for and goes with the plant. The present values as thus obtained, even when the one is greater than the other, furnish good evidence as to the present fair value of the physical property.

When the value of the physical property of the corporation has finally been determined, there remains still another cost which often is legitimately a part of the investment on which reasonable returns should be permitted. This is the cost of developing a paying business. The most perfectly equipped utility plant in existence is useless if it has no customers. The acquisition of customers is a costly process. It involves not only the expense of advertising, solicitation, free experimental service, and other actual outlays, but it may include the entire amount by which the plant during the first few years of its operation fails to pay operating expenses and a reasonable return on the investment. This latter amount may be to some extent offset by exorbitant profits after the plant reaches a paying basis, or by the fact that failures to earn a return may be in part due to poor management or lack of ordinary business judgment. But when all deductions have been made for such circumstances, there will usually be found, at least for some utilities, a steadily decreasing deficit for the first few years, which is fairly chargeable to the cost of developing a paying business. This deficit, being a large part of the cost of a successful public utility plant, is, as a rule, properly added to the present cost value of the property. It is sometimes termed "going value," but is more properly the cost of building up the business.

Just as in the case of the physical property of the corporation, the cost of the building up of the business may be ascertained by finding what it would cost under present conditions to reproduce the present business. This is done by determining from all the available data as to the amount and density of population, familiarity of the people with the use of the service in question, etc., what time would be required for a new plant to build up a paying business. The operating expenses and revenues during such period being capable of estimation, the total deficit for the period may be taken as the cost of reproduction of the business of the plant. This reproduction cost and the actual original cost of the business can then be compared, and the determination of the going value or cost of the business then depends upon the exercise of a sound judgment, based upon these two costs.

The original cost and the cost of reproduction of the plant and of its business ordinarily constitute the best evidence as to what constitutes the fair value of the property. In some instances these two costs are far apart, but in most cases they seem to approach each other quite closely. When far apart, the difference is mostly due to variations in the general price level of the elements, which enter into the construction of the plant and the development of its business as between the time when the plant was first built and the time of the reproduction, although contingencies, mistakes of judgment and errors of various kinds may play important parts. The tendency today, in appraisals, seems to be to attach greater importance to the cost of reproduction than to the original cost. As to which of these factors is the most important is a matter that is greatly dependent on conditions.

When the fair value of all the property that is used and useful has thus been determined the question arises as to what constitutes reasonable amounts for interest and profit on this value, as well as for depreciation and other operating expenses. These outlays, as stated above, may be said to make up the total cost of the service.

The returns to be allowed to the investor usually consist of two elements: The ordinary rate of interest for the use of his money, and a compensation for the risk he has undergone. Both of these items vary with differences in time and conditions. Bare interest, or compensation for the use of money, is largely a question of market rates, and is determinable by a study of the investment market generally, of local conditions. The second element, or the profit to be returned to the investor as a compensation for his risk, and, to a certain extent, for the business ability and management required to look after the investment, is the resultant of many conditions, such as the location of the plant, the prospects of the municipality or region in which it is situated, the circumstances tending to make operating costs high or low, and numerous other factors. Generally speaking, the risk is greater in a new than in an established enterprise. All of these matters when taken together indicate how far the investor is entitled to a return above ordinary interest for the mere use of his money. The best results are secured by fixing rates of return that will cause an unobstructed flow of capital into the public utility field.

Depreciation also is an element in the cost of the service and must therefore be covered by the rates charged for such services. That this is the case is quite obvious not only from the nature of the depreciation, but from ordinary business conditions. Depreciation is incurred because of the service and must therefore, like the other costs of this service, be borne by the takers. Unless it is so borne it would not be possible to obtain capital at such rates of interest as those which are accepted when it is understood that the property is to be kept up.

The operating expenses of the plants also must be audited, examined and carefully analyzed. The reason for this is that only amounts that are reasonable and necessary under the circumstances should be included in the expenses upon which rates are based. These examinations cannot safely be limited to the expenses alone, but must frequently be so extended as to cover all other records of a plant, its methods of operation, the efficiency of its management and many other factors.

When the total cost of the service has been determined, it is necessary to so classify and apportion the various items therein that proper costs per units can be obtained. Such unit costs are one of the requisites for scientific rate making.

In the railway service, the expenses and fixed charges are first apportioned between passenger and freight traffic. When the total cost of the freight traffic has thus been ascertained, it is further apportioned as between the cost of handling the freight at the stations and the cost of moving it between stations. The latter apportionments are necessary because the terminal cost depends on the number of tons handled, while the movement cost depends on the length of the haul. With these costs, together with other necessary operating and traffic statistics at hand, it is possible to determine, for the average loading per car, the gross and net cost per ton of the terminal expenses and the gross and net cost per ton per mile of haul of the movement expenses. These costs per units under average loading are further modified by the effect upon these costs of the respective loadings per car, by the effect of the weight that is and should be given to the value of the articles in rate making, and by the effect of such differences in the cost as are usually found between local and through transportation; the figures or unit costs so obtained are certain to be of the greatest aid in establishing just and reasonable rates. In fact, these figures are indispensable in rate making, even in cases where they may have to be further modified because of competitive and commercial conditions.,

The loading per car greatly affects the cost per unit of transportation. One reason for this is that switching and other terminal expenses per car are about as great for a car that is lightly loaded as for a car that carries a heavy load. Another reason is that in moving the freight between the stations, the cost per ton is as great for the car itself as for the freight in the car, and that in light loading, this cost of moving the car alone must be borne by a smaller quantity of articles or pay freight, while under heavy loading this cost per car alone is distributed over larger quantities of articles. Owing to these facts, the net costs per unit are often several times as great under light as under heavy loading.

Local or way freight trains, owing to the frequent stops that are necessary in handling traffic from station to station, make less mileage than trains which handle through traffic. They also, as a rule, carry lighter loads. The result of this is that the costs per unit of traffic are often somewhat greater for local than for through traffic.

The value of the articles is a recognized element in rate-making. While it costs no more, when other conditions are the same, to transport more costly than cheaper goods, the former involve greater risks, and can bear much higher charges. Rates that cover their proportion of the operating expenses, including interest and profit, at the rate of say 30 per cent., may be less of a burden on high grade traffic than is the case of rates which cover their share of the operating expenses, including interest and profit, at the rate of say only 3 per cent. for low grade traffic. To charge higher rates for more costly than for cheaper commodities is in line with public interest, for it is only at lower than average rates that many low grade materials will move at all.

Competitive and commercial conditions must also be recognized. While, owing to consolidations, active competition is less important than formerly, it is yet a force that must receive consideration in rate-making. To meet conditions of this nature, it is often best for all concerned to accept competitive business at rates which are high enough to cover the additional cost of handling such traffic, plus a small amount above this for fixed charges, provided, of course, that such low rates can be put into effect without unjust discrimination in other respects.

Few subjects are more complex than these which involve rates that are equitable and just to all concerned, and few are also of greater importance to the public. Rate schedules under which each department and each customer are made to bear their just share of the total cost of the services do away with unjust discrimination in rates. They provide like rates for like services under similar conditions. This is of special importance in the transportation field, and in the case of power rates, wherever slight advantages or disadvantages stand for success or failure, not only among industrial enterprises, but among localities as well. The value to the public of the elimination of rates that are too high and of discriminatory practices of this kind and of the establishment of equal conditions in these respects, is many times as great each year as the cost of maintaining the commission.

UNIFORM ACCOUNTS AND REPORTS.

Whether the principles which govern public utility regulation are violated, is largely a question of facts. It is in order to find the facts that the service of such utilities is inspected and other activities investigated. To this end also it is necessary that their accounts and records should be kept on some basis that is uniform, that discloses the integrity of the various items, and under which they are so classified and arranged that they may be subjected to the proper analyses. In fact, effective regulation is largely, if not entirely, dependent upon the degree to which the actual facts involved are known and understood.

The Wisconsin law provides that every public utility shall keep such uniform accounts and records of all the business transacted and make such reports thereon as may be required by the commission. In accordance with this, the commission has prescribed classifications and forms of accounts, records and reports for each class of utilities of the same kind. They have now been in effect for some years and have brought good results.

Accounts so kept and reports so made enable comparisons of like facts for the same utility from time to time as well as between different utilities. They show all changes that take place in the various items and enable one to judge of their integrity. They disclose whether plants are efficiently operated and point out ways of improvements in the operation. They enable the various items to be grouped with reference to the causes from which they emanate as well as in accordance with proper units upon which for one purpose or another they may have to be apportioned. They disclose maximum, minimum, average and normal costs per unit, as well as other elements that are of the greatest importance. In fact no statistical compilations and no unit costs could be secured that would be of real value unless the financial and the operating reports were compiled upon a uniform plan of this kind.

Even when so kept, the accounts and reports often require careful checking and auditing. No important rate case, for instance, is passed upon without the examination of books and records.

CAPITALIZATION.

Another important duty of the commission is to supervise the issuance of securities. Under the Wisconsin law, public utilities cannot issue stocks and bonds without a certificate of authorization from the commission, and they can be issued only for cash, property or services. If the payment is in property or services, an appraisal of their value is made by the commission, so that in no case will the security issues exceed in amount the value paid into the corporation. The commission also takes care that the bonds shall not constitute an unduly large proportion of the security issue. The purpose of all this is to establish as close relations as possible between the investment and the securities issued, and also to keep the management of the property in the hands of those financially interested in it.

The evils of overcapitalization of public utilities are many.

It makes the securities a speculative instead of an investment proposition. It contributes toward keeping the small local investor out of the public utility field, because the small investor will not risk his capital unless the securities offered to him are not only placed on a safe basis but are fairly demonstrated by some trustworthy authority to be so placed. This exclusion of the local investor from the public utility field is a great loss both to the investor and to the public utility. It deprives the former of a better paying investment than the savings bank, and as to the latter, it prevents that community of interest and harmonious relation between the utility and its customers which is likely to be present if the customers have a financial interest in the utility. This point, though generally overlooked, is exceedingly important, especially under the conditions of public sentiment toward public utilities that are generally prevalent today. A fairly general local holding of public utility securities would go farther in preventing the unpleasant and often expensive controversies that now so frequently arise between utilities and their patrons than almost anything else that can be mentioned.

Furthermore, since overcapitalization increases the risk to investors, it must also tend to increase the rate of return which must be allowed on their investment, for as has already been explained, the element of risk is of much importance in determining the reasonable rate of return. That many utilities, because of their financial methods, find it difficult to obtain needed funds at reasonable rates of interest, is only too well known, and the result is an economic waste that could easily be avoided. Overcapitalization also tends, in the absence of strict regulation of rates, to keep the utilities' rates higher than they would otherwise be, for strong pressure is exerted upon the management to pay dividends on the inflated capitalization, and reductions in rates are vigorously opposed by the security holders. Another result of this pressure is that earnings, which should be used to provide for repairs and depreciation, are often paid out to the security holders in interest and dividends, and the service of the plant naturally deteriorates. Failure to provide needed extensions to the plants is another important result of this policy.

Overcapitalization also has a bad moral effect on officers, employees and the public, because it represents both efforts and training in receiving something for nothing. It is often a means for covering up excessive earnings and an excuse for bad service.

All reasonable expenditures in promoting, financing and constructing the plant and developing its business are proper subjects of capitalization. If such items only are capitalized, then it would also follow that the outstanding securities would agree quite closely with the amounts invested and with the amount upon which investors are entitled to reasonable returns for interest and profit, at least under normal conditions.

As the utilities are managed or operated by the stockholders or their representatives, it is of the utmost importance that there should be a proper relation between the stock and bond issues by which the investment is represented. When, as is often the case, the bonds represent practically the entire cost of the plant and its business, and the stock little or nothing in the way of actual investment, it necessarily follows that the business may be managed and the operations controlled by those who have no actual investments of their own to look after, and who may therefore have more to gain from a reckless than from a proper and honest management.

One of the most effective means, therefore, to bring about honesty and effectiveness in managements is perhaps the one that has been suggested, namely this, that no stock should be issued which does not represent outlays either in cash or property or in performing needed service. Experience teaches that properties and business are, as a rule, much better managed by owners than by those who are not owners. The proportion of the equities in a plant that should thus be represented by stock is a matter that must largely depend on the circumstances in each particular case. Ordinarily, however, it should not be much less than one-third.

Applications for security issues must be accompanied by detailed statements showing the purposes for which the issues are desired as well as statements showing the assets and liabilities and the earnings and expenses of the plant. These statements are closely examined by the commission. When the issues are made for other property than cash, such property is also carefully appraised. In addition to this the plants are also required to make subsequent reports upon how the securities issues were exchanged or the proceeds therefrom expended. These reports are also examined and verified by the commission. In this and other ways security issues are closely regulated.

Economic theory and public policy demand that in cases where monopoly conditions prevail there should be close relation between the amounts judiciously invested and the securities by which this investment is represented. Any other course in the public utility field is, in the long run, almost certain to result in poorer service to their customers and in losses to their investors. In other words, the gains which come to the few from improper financial practices are inequitable and in the end are also certain to have to be unjustly borne by the public.

REGULATION OF CAPITAL EXPENSES.

There is one more field in which the commission has an important function in promoting the highest efficiency and lowest cost of public utility service. This is in the prevention of duplication and waste in the establishment and extension of both railway and municipal utility plants. It is recognized by the railroad and public utility laws of Wisconsin that public service corporations are in their nature monopolies, and that the interests of the public are best conserved by protecting monopoly in these industries and at the same time supervising and regulating them in the public interest. To carry out this purpose, competition among public service companies in the establishment of new lines and plants is prohibited except under such conditions as make its existence a benefit to the public.

In the case of railway companies, the Wisconsin law provides that before new lines are built or extensions are made, a certificate must be obtained from the commission stating that public convenience and necessity require the construction of the new line. The problem here is somewhat different than in the case of most municipal utilities, for no two railways serve exactly the same territory, and although the terminals and some of the intermediate stations may be the same, it may well be that the remainder of the territory traversed is so badly in need of railway facilities that the authorization of the entire line may be warranted. In such cases the amount of population, its tendencies as to growth and industry, the availability of existing facilities, and many similar facts are material and require careful consideration. It is also important to determine whether the new line is likely to be capable of profitable operation, for a railway line which cannot make expenses is likely to be more of a burden than a benefit to the community.

By keeping fairly close rein on the investment of capital where another investment has already been made for the same purpose, and at the same time permitting such extensions and even duplication as will result in the greatest development of profitable business and the widest diffusion of needed services among the public, the commission's regulation of capital expenditures is capable of producing very beneficial results to investors and a permanent advantage to the consuming public.

THE WIDE FIELD FOR REGULATION BY COMMISSION.

It appears from what has thus been said that there is a widespread need for effective regulation of the services, rates and financial practices of public utilities, and that such regulation, when fair, is in line with public policy; that such regulation should be largely governed by existing conditions, and that it should be flexible enough to properly adjust its activities to such conditions; that it is more concerned with preventing future wrongs than with redressing past offences; that the wrongs it is designed to prevent are comparatively small when considered individually but large when taken in the aggregate; and that

since many of the individual wrongs are small, it is of the greatest importance that some method should be devised under which they can be adjusted at the lowest possible costs to those who are thus harmed.

We thus find that the work of regulation is of such a character that it does not fit in with the work of the courts. Courts deal with what has happened rather than with what may happen. They redress wrongs already committed and the precedents they establish serve the same purpose. They are not prescribing, establishing and enforcing rates and regulations to be complied with in the future. Not being equipped with trained staffs for this purpose they are not in position to gather the facts that are required for intelligent regulation nor to exercise the necessary supervision in connection therewith. Their methods of procedure are slow, formal, and costly to the litigants. They are adjusted to work of a character different from that which is involved in the regulation of public utilities.

Franchise and other legal provisions fall short of providing such regulation as is needed. Provisions of this sort are seldom based on actual conditions, the data needed for this purpose not being available. Fair rates and adequate services can only be determined by such processes as those outlined above and this work can hardly be continuously carried on except by bodies which are organized for this purpose. Conditions by which such regulation must largely be governed are also constantly changing. Rates, for instance, which are fair when put into effect may be unjust shortly thereafter or long before franchise and other provisions expire. This is also true of service and other regulations. Methods of regulation which are inflexible and which remain the same regardless of conditions are more likely to be harmful than beneficial. In such matters it is seldom safe to rely on guesses as to future conditions. Franchises and other laws of this sort are also as a rule ineffective for lack of proper enforcement.

It is because effective regulation of public utilities cannot be had either from the courts or from franchise and other provisions of this kind and because competition is also ineffective for this purpose, that people in this country are turning to the public utility commissions for relief. From such experiences as we have so far had in this matter, it also seems that such commissions, when provided with such power and such equipment as those conferred by such laws as the public utility law of Wisconsin, are the very tribunals that can best meet this demand.

Public utility commissions of this kind are established and organized for the very purposes of such regulation. They are therefore provided with the employees and other facilities that are needed for the establishing of reasonable rates and standards of service and of seeing to it that these rates and standards are actually complied with. They are also required and equipped to perform much other work in the same line. In addition to that they have all the power that is necessary to carry their work into effect. The inspection and supervisory power which such commissions have are among the most important features of the work. It seems to contribute more towards establishing equitable and fair conditions in the public utility field than almost anything else.

Such commissions being appointed for a long term of years, and charged with important duties of a highly technical character are also likely to be taken almost entirely out of politics. This means that politics alone will not shape their policies; that irrelevant and disturbing influences of all kinds are gradually being eliminated from their work, and that they are able to adopt sound policies and to determine the question before them on their merits. The importance of all this is much greater than is generally realized.

There is perhaps no more important feature of commission regulation than the fact that it affords an inexpensive and, for the most part, prompt remedy for such grievances as are constantly arising between individuals and the public on one hand and utilities on the other. In Wisconsin, for instance, by far the greater proportion of the complaints of all kinds are settled either through correspondence or in informal conferences. All the aggrieved party does in most of these cases is to write the facts to the commission. The commission thereupon investigates the matter. In fact it does practically all the work that is necessary for settlement of the same upon the facts.

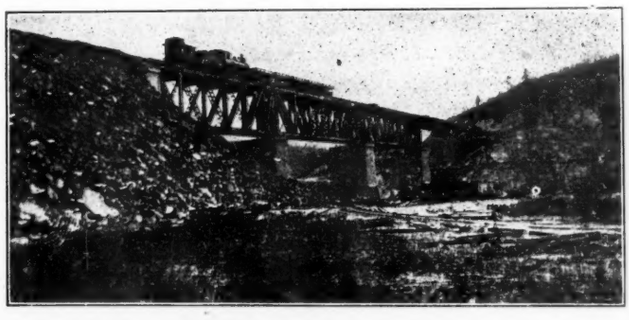
While state regulation through commissions in the form in which it exists in Wisconsin and a few other states dates back only a few years, it has probably been in existence long enough so that the experience under it will disclose whether it fairly meets the purposes for which it was created and whether it yields results that are in line with public policy. On the one hand it can be said that regulation has resulted in better service at lower rates and that it has done away with most forms of unjust discrimination. The direct benefits thereof to the public have been great. These benefits have also been obtained without injustice to the utilities or their owners. The indirect benefits therefrom, such as accrue from the facts brought to light and published in all work of this kind are also important. Such facts have become the basis for demands for improvements in the conditions as well as the means by which unjust suspicion and unfair agitation have been allayed. Publicity is always an important factor in all matters affecting public interests. This system of regulation has also in a measure taken the utilities out of local politics.

On the other hand, it must be admitted that it has not brought the millennium. Many are much more critical of the service and exacting in their demands in this respect than they were before regulation was ushered in. Others again are much disappointed because the reductions in rates have not been greater and because the values placed on the plants have not been lower than those so far ordered. Some are also more or less disgruntled because the cases they may have started, cannot be decided immediately, or because they cannot always be safely passed upon until the plants have been appraised, their accounts audited, their other records checked, the hearings held and the reports upon the law and the facts prepared. Most of the complaints against regulation of the kind in question here are without foundation. They are much more frequently actuated by personal or political interests than by questions of public policy.

A NOVEL DESIGN FOR A HIGH ABUTMENT.

BY E. F. ACKERMAN,
Assistant Engineer, Lehigh Valley, New York City.

The Lehigh Valley has recently completed the construction of a cut-off 13 miles long between Ashmore and Hays Creek, Pennsylvania. This line extends almost entirely through mountainous country and has a ruling grade of 1 per cent.



The Completed Structure.

compensated for curvature, descending from Ashmore to Hays Creek with a total fall of 437 ft. Among other advantages, the cut-off effects a saving in distance of 10¾ miles in the movement of coal from the Hazleton coal region to points in the west. Work on this line was started about August 15,

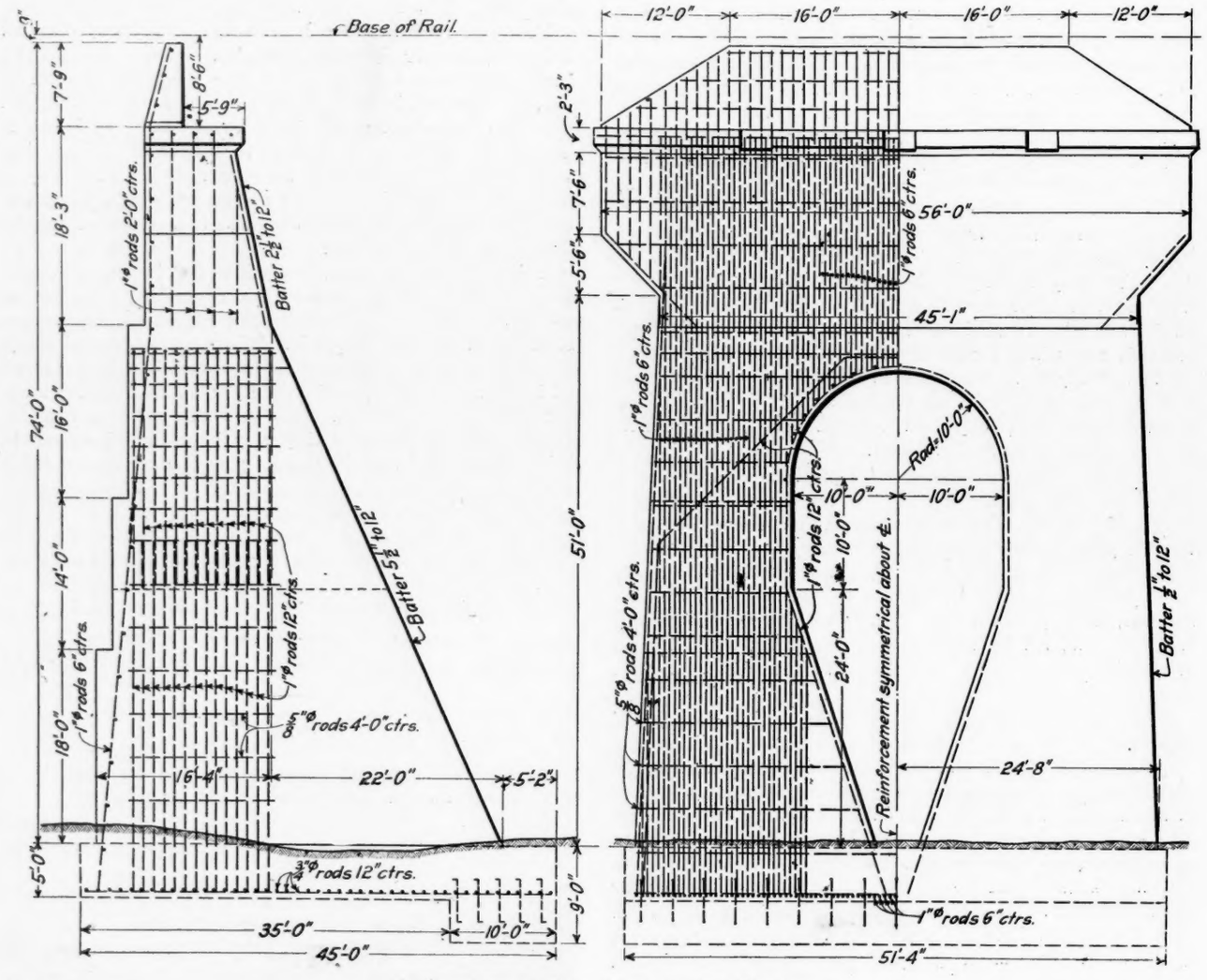
1910, and the line was opened for operation December 26, 1911.

There are three bridges on the line, of which the most important is the one over the main line of the Central Railroad of New Jersey and the Lehigh river. This bridge is 632 ft. long over all, and consists of two deck girder spans over the railway and three riveted deck truss spans over the river, all built for single track. The base of rail is 87 ft above low water. The substructure, which was built for double track, is of concrete and consists of two abutments and four piers, one of which is located in the middle of the river.

One of the abutments was of rather unusual design and was known as the pier abutment, because of the fact that the embankment was allowed to slope about and practically bury it. The abutment was located on the river flat which was inacter resting on yielding ground, it was decided to build a structure that would eliminate as far as possible the thrust of the embankment. This was accomplished by filling entirely around the abutment to neutralize to a certain extent the earth pressures, and by placing an arch opening in the structure, thereby reducing the back area by about 18 per cent. The design of the structure is shown by the accompanying plan.

The arch opening was further effective in reducing the foundation pressure by an amount represented approximately by the difference in the relative weight of the concrete replaced by the earth fill. The arch opening represents a volume of 602 cu. yds., or 30 per cent. of the total yardage of concrete above the foundation footing, which amounted in all to 1,995 cu. yds.

The foundation footing containing 640 cu. yds. of concrete



Side and Front Elevations of High Abutment.

undated years ago by a dam then existing about a quarter of a mile down stream. Sawdust from the various saw mills of that period collected and settled over the flat for a depth of about 6 ft. Test pits to a depth of 12 ft. disclosed a mixture of silt and sawdust, very fine river sand, soft red clay and some boulders and deeper tests with a Calyx drill indicated soft clay and numerous boulders. Although ledge rock outcropped along the right shore of the river at a point about 250 ft. up stream from the bridge, it was impossible to test to rock with the apparatus at hand.

It was originally intended to carry the foundations to rock, but as this was out of the question and as there was to be an embankment 73 ft. high built of material of unknown char-

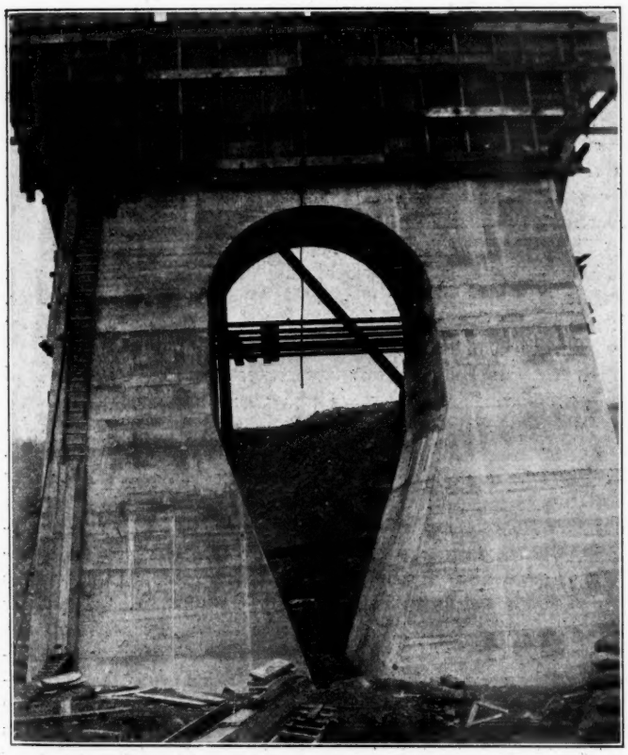
consists of a slab 6 ft. thick and 45 ft. wide by 45 ft. 4 in. long, with a toe in front designed to resist any sliding action, and the base was designed for a uniform pressure of about 2.7 tons per sq. ft. Tests of the bearing value of the foundation material indicated approximately 3.8 tons per sq. ft., at which load practically no settlement was observed in 24 hours. Check levels made during the progress of the work showed very slight settlement, not exceeding 0.02 ft., and after the completion of the structure and embankment around it, there was no settlement whatever, neither was there any evidence of movement due to the action of the embankment. In order to economize in the amount of concrete, and at the same time provide against the embankment running around the backwall and covering the

lower chords of the truss, wings or ears were cantilevered out at each end of the bridge seat, thereby lowering the slope line in front of the abutment.

The abutment was constructed during the winter with excellent results. Although freezing weather prevailed, the temperature sometimes falling to zero and below, the work was carried on by placing a steam jet in the mixer and by heating the sand, gravel and stone piles with a system of steam pipes placed underneath. Although the concrete was mixed about 1,500 ft. from the bridge, its temperature when placed in the form was approximately 75 deg. F., and when quitting work for the day, the temperature of the air in the form was approximately 35 deg. F. in zero weather. At night the top of concrete was protected with a covering of tar paper and tarpaulin, and next morning the protective covering would be white with frost, although the concrete was still warm. Three days after filling, the forms would be moved up for the next lift and the supporting rods removed. These rods, when withdrawn were too hot to handle with bare hands.

The accompanying photographs show the masonry during construction. The six rails placed about 4 ft. below the springing line were put in by the contractor to support the centering for the arch and were not provided for in the plans.

The embankment was dumped from narrow gage cars on



The High Abutment Before Forms for the Last Course Were Removed.

trestle placed back of the abutment, rehandled in wheelbarrows and deposited in front of the abutment for a height of about 20 ft. The balance of the fill was made by dumping from the completed bridge, the material being discharged over timber aprons which prevented the dumped material from striking the steel trusses. A gang of laborers rehandled the material, as dumped, so as to conform with the desired slopes. As a precaution against scour by floods, the toe of the slope was protected by a dry stone wall, or rip rap, about 4 ft. thick and 8 ft. high.

The river pier was started late in December, 1911, the first work consisting of the building of a squared timber coffer dam. This dam was constructed on the ice and then sunk through it. Before the work of driving sheeting around the dam was completed, there was a sudden thaw and a rise of water, causing the total loss of the coffer dam. The contractor abandoned the idea of replacing the timber dam and resorted to a bag dam consisting of about four rows of gunny sacks filled with fine loamy sand and piled about six rows high. Excavated material was banked on the outside of the dam and the water which was about 3 ft. deep was pumped out. The excavation work was done during severe winter weather and it was possible to excavate to a depth of 12 ft. below the bed of the stream without resorting to sheeting as the seeping water froze as fast as it appeared on the interior of the excavation, practically preserving nearly vertical excavation faces.

The Completed Abutment.

A 6 in. centrifugal pump readily unwatered the foundation by working about four hours daily.

As a second track may be built at an early date, the down stream line of trusses of the three spans over the river were designed and built to carry one entire track, so that when the second track is required it will only be necessary to add a third truss on the down stream side without moving or changing in any way, the three trusses already built, which will then be center trusses between the two tracks. The plate girder spans on the south side of the river were built for single track, as their spacing permits of building the separate spans. However, the inside column of the bent carrying the long plate girder span was also built to carry the additional weight of the second track.

The work was done under the direction of E. B. Ashby, chief engineer; F. E. Schall, bridge engineer, designed the masonry and the superstructure, and the writer was in charge of the construction.

RAILROAD CONSTRUCTION IN PARAGUAY.—The concession for constructing the Northeast Paraguay Railway has been extended one year by the government. Its construction should have been started in 1912, and according to the concession the line is to run from Asuncion to the Guayra Falls, joining up there with the Brazilian line to Sao Paulo. It is estimated that by the end of 1915 the line will be completed both in Paraguay and Brazil, thus giving Asuncion direct communication with the cities of Sao Paulo and Rio de Janeiro. Before the close of 1914 the railway known as the Trans-Paraguay will be open to traffic, thereby connecting the Paraguay Central Railway with the Brazilian line at the Iguazu Falls, thus bringing Rio de Janeiro within 60 hours of Asuncion.

TRAIN ACCIDENTS IN FEBRUARY.[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of February, 1913:

Collisions.

Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd.	Inj'd.
4.	Grand Trunk.....	Edwardsburg.	rc.	F. & F.	2	4
*6.	St. Louis, I. M....	Collinston.	xc.	P. & F.	0	3
*16.	N. Y., N. H. & H....	New Haven.	rc.	P. & F.	0	0
20.	Boston & Albany.....	Bondville.	rc.	P. & F.	0	2
21.	Penn. Lines.....	New Alexandria.	rc.	F. & F.	1	0

Derailments.

Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd.	Inj'd.
1.	Houston & Tex. Cen..	Benchley.	d. track.	P.	2	9
2.	Illinois Central.....	Seward.	b. rail.	P.	0	0
4.	L. & J. Bridge.....	Louisville.	ms.	F.	1	0
26.	Atch., T. & Santa Fe.	Weitzer.	unx.	P.	0	0
27.	Ches. & Ohio.....	Stepstone, Ky.	unx.	F.	0	1

The trains in collision near Edwardsburg, Mich., on the fourth, were eastbound freights. The caboose and three cars of the leading train were wrecked and the engine of the other was badly damaged. Six trainmen and other employees riding in the caboose of the leading train were injured, two of them fatally. The second train should have been held at Edwardsburg, but it is said that by reason of a snow storm the engineman did not see the flag which had been displayed to stop him.

The collision at New Alexandria, Ohio, on the 21st occurred on a side track. A standing freight was run into by a following freight and the flagman of the standing train, who is believed to have been asleep in the caboose, was killed. Failure to protect the standing train and excessive speed in bad weather by the other train are given as the causes of the collision.

The passenger train derailment which occurred near Benchley, Tex., on the first, occurred about 3 a. m. The train was No. 17, and it was running about 40 miles an hour. The engineman and fireman were killed and six passengers and three trainmen were injured, the passengers not very seriously. The derailment was due to irregular track, caused by continuous heavy rains.

The train derailed on the road of the Louisville & Jeffersonville Bridge Company, at Louisville, Ky., on the morning of the fourth about one o'clock, was a switching freight moving backward. A brakeman jumped off or fell off one of the cars and was run over and killed. The cause of the derailment seems to have been a misplaced switch.

The train derailed near Weitzer, Col., on the 26th was southbound passenger No. 568. The derailment is believed to have been caused by the loosening of a tire of one of the wheels of the locomotive, and the engine was overturned. The trainmen and fifty passengers on the train escaped with slight injuries.

The train derailed at Stepstone, Ky., on the 27th was eastbound freight No. 92; and 14 loaded cars were wrecked. A trespasser riding on one of the cars was injured. The cause of the derailment has not been determined, but seems to have been excessive speed with a top-heavy car—a refrigerator loaded with beer.

Electric Car Accidents.—Of the accidents to electric cars recorded in the newspapers as occurring in the United States in the month of February, only one is reported as having been attended by fatal results, a collision between a passenger car, fully loaded, and a freight car, near Cheshire, Conn. About 40 persons, altogether, were injured, but only one fatally.

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc. ——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

ARBITRATION OF THE FIREMEN'S WAGE CONTROVERSY.

W. J. Lauck* was the last witness called by the firemen in the arbitration proceedings. After one day's recess the railroads opened their case on Friday morning last. Before calling the first witness, Elisha Lee, chairman of the conference committee of managers, made a statement from which we quote as follows:

"With the indulgence of this board, I should like to say a few words as to the general theory which will underlie the evidence we shall present and ask you to consider. The railways appear before this tribunal as institutions built up by the investment of private capital and yet unable to control the price at which they may sell their transportation, to produce which is the purpose of their existence. We believe that it is wise and in the public interest that the people should, through properly constituted commissions, protect themselves against unreasonable or discriminatory charges or practices by public utilities. But the railroads constitute institutions which not only cannot control the price of their product, but they have not the privilege of getting, in the cheapest market, the labor with which that product is largely manufactured. They must keep the transportation machine moving. The public has given unmistakable evidence of a disposition highly to disapprove of any interference with railroad operation, no matter by whom caused.

"It was in recognition of our responsibility to this public that we consented to abide the arbitrament of this board. We conceded that the firemen were faithful and hard working. We offered to apply the conclusions of the fair and able board which adjudicated last summer the case of the engineers, but the demands of the men were so far beyond what we felt we could in reason concede, that an impasse was created which, to prevent the public inconvenience of a strike, your honorable board was constituted to dissolve.

"This board represents the public in a peculiar sense. It embodies primarily the widespread and justifiable view that strikes on public utilities should not be permitted to take place. It gives visible evidence of the principle that public convenience is paramount and that to that end all interests must bow. To such sentiment the railway companies feel a keen sense of responsibility. Their corporate character renders them peculiarly subject to a belief on the part of the public that responsibility for any cessation of traffic rests solely upon the railway managers. To our firemen friends, however, this sense of responsibility does not seem to be so acute. They represent no one but themselves, not even their fellow-workmen in other lines of railway employment; they cannot experience the direct results of public displeasure. Railway employees have come to know that a strike which would tie up traffic is well nigh unthinkable. They know that if a strike doesn't take place the railways must give way The men make large demands upon railway managers, not expecting those demands to be granted but believing that arbitration must take place, and that in the end the splitting of the difference between what they demand and what the railways offer will result in their favor. In thus stating the case we but paraphrase the observations of the representative court which adjudicated the case of our engineers but a few months ago.

"The plan of labor leaders has been to get the roads paying lower wages to raise them, then apply pressure to those paying higher wages to re-establish the previous differential. Step by step, the campaign has proceeded. Thus, today, the railways are face to face with large demands from their trainmen.

"We are likewise confronted with constantly increasing demands through mandatory legislation. The New York Central estimates that the cost to them, and the waste to the public, of the extra crew bill now pending in New York, will be over $700,000 per year. The purpose of these citations is to place before this tribunal something of the state of mind and the feeling of un-

*See *Railway Age Gazette*, March 21, 1913, page 667. The arbitration proceedings thus far have been reported in the *Railway Age Gazette*, issues of March 14 and March 21.

certainty of railway managers in their dealings with their labor.

"In the presentation which the railways will make to this court, therefore, we shall ask you to bear in mind these somewhat intangible, but nevertheless essential elements in the situation. All the roads concerned in this movement do not plead poverty or impending bankruptcy as a reason why even the whole of the demands of the firemen should not be granted. The basis of our contention, the theory which has pervaded all our negotiations is this: Appreciating our responsibility to the public to provide an adequate and efficient transportation machine, menaced upon every side with growing burdens making it constantly more difficult for us to obtain adequate capital with which to finance needed improvements, unable to estimate either our revenues or upon what basis of cost we shall be permitted to earn them, we have felt it our duty not only to our shareholders, but to the public whom it is our duty to serve, to resist to the breaking point those demands of labor which we believe are extravagant and entirely out of accord with our obligations as a whole. We now propose to show that these men are today well paid for the services rendered and the rules and working conditions are such that they do not require the radical changes requested."

In reply to a question from Judge Chambers, Mr. Lee said that there may be some roads in the conference whose wages to firemen are too low, but he questioned if this were the best way to raise them. He also objected to the basis of weight on drivers as being unfair, and cited the case of a small freight locomotive and a large passenger locomotive, the former often earning more for a railroad than the latter.

W. H. Holbrook, a road foreman of engines on the Pennsylvania Lines West, was the first witness called. He said that in case of a slacking off in business, the firemen are almost invariably the ones to ask for a reduction in the number of men. There are about 40 mechanical stokers in use on his division which are a great help and lighten a fireman's work very appreciably. One fireman told him of making 50 trips with heavy passenger trains and never having to do any hand firing after leaving the terminal. It is necessary to fire about 500 lbs. of coal by hand in preparing the fire. From his experience, he estimated that a stoker at present will do about 70 per cent. of the firing on any locomotive, and that with a few improvements it will do 100 per cent. all the time. He said the firemen were friendly to the stokers, and were glad to fire locomotives equipped with them. He did not consider the filling of a lubricator dangerous work if the instructions which are issued are carried out.

J. H. de Salis, chief road foreman of engines of the New York Central & Hudson River west of Syracuse, N. Y., was the next witness. He said that, in his opinion, firemen do not have as hard a time now as in 1902, considering all conditions. On the Mallet compounds used on the Pennsylvania division an extra man is provided to help over certain hard pulls in the summer months. He told of what are called split runs on the New York Central, in which one engineer runs a locomotive over the entire division but the fireman goes only half way and is then relieved. Going west this results in the company's paying firemen for 180 miles when only 152 are run, and going east they are paid for 200 miles, or $5.90. Mr. de Salis said that his understanding of the schedule now asked would raise this to $10.05 for two firemen in each case, or four over the whole distance. This refers to article nine of the firemen's request, which states, "Rates of wages that are higher and conditions of employment that are better than specified will remain in effect. . . ." Mr. Carter and Mr. Lee discussed this point for some time, but Mr. Carter claimed that it was not the intention to place four men on this run. Mr. Lee said that there was nothing in the article to indicate that four men would not be required. Mr. Carter suggested that any difference later could be referred back to the commission for adjustment and Judge Chambers asked if he would make that a ten-year proposition and attach a salary. Continuing, Mr. de Salis said he did not consider weight on drivers a fair basis for paying the men, and also that locomotives equipped with superheaters greatly decreased the firemen's work.

Mr. Merkle, assistant road foreman of engines on the Cumberland division of the Baltimore & Ohio, followed. He said that the Mikados on his division are equipped with Street stokers and that as soon as a fireman becomes accustomed to the use of the apparatus he has no trouble. He previously ran a locomotive equipped with a stoker and said there was no reason why a fireman could not familiarize himself with one, and that the older firemen asked for the locomotives so equipped. He estimated that with the Street stoker not over 5 per cent. of the coal has to be fired by hand and also said that, personally, he would just as soon fire a large locomotive as a small one. He did not know about men being paid $1.00 a day extra to go to the Cumberland division, as a fireman witness had previously stated, but said that they had no more trouble keeping men there than elsewhere.

The next witness was J. S. Cavey, of the Baltimore & Ohio. He gave figures for a number of tests which he conducted on Mikado type locomotives in through freight service between Philadelphia and Baltimore. The conditions were as nearly as possible the same, except that in one series the firemen were instructed in the method of firing and in the corresponding series they were not. An average of six trips, instructing the men, showed 12,700 lbs. of coal burned, while without instruction the average was 16,500 lbs. In another case the average of four trips with instructions was 14,600 lbs., and of eight trips not supervised, 20,400 lbs. Mr. Cavey said that, in his opinion, firemen commonly burn much more coal than is necessary.

S. G. Wise, assistant road foreman of engines on the Middle division of the Pennsylvania Lines East, gave the results of a number of tests made to compare superheated with saturated steam locomotives. For consolidation type freight locomotives, one of these tests gave the following results:

	Weight on Drivers.	No. of Cars.	Tons in Train.	Coal Burned.
Saturated	211,000 lbs.	72	5,106	22,000 lbs.
Superheated	219,900 lbs.	82	5,900	18,800 lbs.

Mr. Wise also gave figures to show that firemen make, as a rule, as great a monthly mileage as engineers. In the cross-examination Mr. Carter did not succeed in shaking the witness in any way. Instead of getting him to admit that firemen are poorly paid, he brought out that Mr. Wise, while a fireman at less wages than are paid now, bought his own house and some others which he rents. Asked how he could live today on $60 per month, the witness said that their firemen now make over $100 per month, and that it does not, in his present position, cost him $100 per month to live and pay the expenses of a son at college.

M. C. M. Hatch, superintendent of fuel service, Delaware, Lackawanna & Western, followed Mr. Wise. He gave the following results of tests made on the Buffalo division with consolidation type locomotives with two firemen and Mikados with one:

	Consolidation.	Mikado.
Coal per locomotive mile, lbs.	187.6	182
Coal per hour, lbs., about	2,400	2,100
Average speed, miles per hour	13	15
Average coal per trip, lbs.	26,450	20,000

He said that the second man had practically nothing to do between shifts but take water.

Two of the same class of consolidations, one with a superheater and brick arch and the other without, under the same conditions showed a saving, per locomtive mile, of 11 lbs. of coal in favor of the superheater and arch. Mr. Hatch stated that by actual count, the number of scoops of coal fired on a Pacific type locomotive between Scranton and Hoboken in 3½ hours was 395. He also gave the following figures for passenger locomotive tests, the train and speed being the same in both cases:

	Ten-wheel type. (Wt. on drivers, 171,000 lbs.)	Pacific type. (Wt. on drivers, 180,000 lbs.)
Coal per trip, lbs.	18,350	12,850
Coal per locomotive mile, lbs.	135	94.5

Mr. Staub, statistician of the Delaware, Lackawanna & Western, gave figures to controvert the testimony of a witness on the firemen's side regarding the use of a second man on locomotives on the Buffalo division.

At the opening of the session on Monday Mr. Carter read a telegram from the chairman of the firemen's committee of the Toledo, St. Louis & Western saying that he had been informed by the superintendent that the conference committee had not been authorized to represent this road in agreeing to arbitrate, and that the road would deal directly with its employees. Judge Chambers remarked that if the road ever had been in, the board would attend to their staying in.

Daniel McBain, superintendent of motive power of the Lake Shore & Michigan Southern, presented figures to show that the work of the firemen had not increased to the extent that the testimony of the firemen's witnesses would lead one to believe. Mr. Carter read from the minutes of the convention of the American Railway Master Mechanics' Association at Atlantic City in June, 1912, a statement by C. H Hogan, assistant superintendent of motive power of the New York Central & Hudson River, that it was "almost beyond human endurance" for a fireman to fire one of the new, big freight locomotives at her maximum capacity and with a maximum tonnage. Mr. Carter presented a statement, which was reported as having been made by Mr. McBain at the master mechanics' convention in 1910, to the effect that in the last few years there had been "a tremendous increase" in tonnage with efforts to make better speed, and that it was difficult to get a man who could put into the fireboxes enough coal, and that he recommended mechanical stokers. Mr. McBain agreed that this was true.

The next witness was A. Seiders, road foreman of engines on the Philadelphia & Reading. He said that firemen on the Philadelphia & Reading made as great or greater mileage than enginemen.

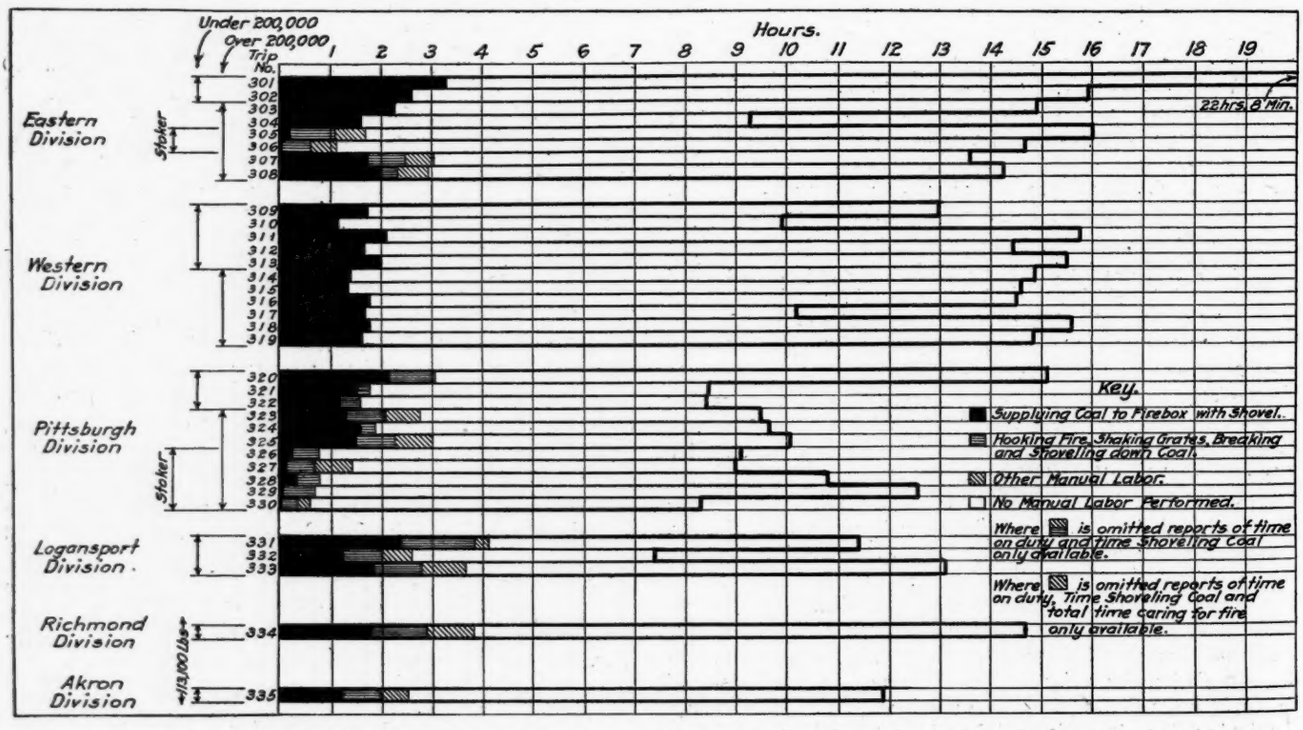
S. A. Bickford, road foreman of engines on the electric division of the New York Central & Hudson River, described the work of a fireman on an electric locomotive as consisting largely in looking out for signals, ringing the bell, and in winter attending to a small boiler which supplies heat for the train.

J. V. B. Duer, foreman of motormen on the New York division of the Pennsylvania Railroad, confirmed Mr. Bickford's statements and said that firemen on the electric locomotives on the Pennsylvania got the same scale of wages as firemen on steam locomotives.

J. F. Carroll, assistant general superintendent of motive power on the Baltimore & Ohio, described the successful use of mechanical stokers on the B. & O.

W. C. Hayes, superintendent of locomotive operation of the Erie, told of his experience with putting two firemen to a locomotive. He said that two men had been put on the Erie's heavy locomotives in response to demands of the firemen, but that the second man had been taken off after it had been discovered that although two men were assigned to a locomotive, only one was in many cases on the locomotive, the men taking turns at laying off and playing pool in the Y. M. C. A. building at the foot of the hill. In cross examination Mr. Carter tried to bring out a statement as to the heat in an attempt to show that the second fireman had remained at the bottom of the hill to get his feet cooled. Mr. Carter himself made the statement that it was 140 deg. 6 in. above the deck of the engine.

On Tuesday morning E. B. Dithridge, chief clerk in the general manager's office of the Pennsylvania Lines West, was the first witness. He said that he worked for nearly 20 years for the Pennsylvania and had been chief clerk in the general manager's office for nearly 11 years. He made a comparison of conditions and rates in 1902 and 1912 on the 100 miles on the Pittsburgh division between Dennison and Columbus. He said that in 1902 there were 24 H-4 engines and 25 H-6 engines in service on this division, and in 1912 13 H-4's and 68 H-6's. He said that just previous to the increase of wages which was made in January, 1902, the trip rate for the H-4's and H-6's was $2.14, with overtime after 11 hours, and that the trip rate today between the same points for the same class of service was $3.05, an increase of 42 per cent. Overtime today is at 30 cents or 30½ cents an hour, as compared with 19 cents in 1902, and overtime now begins after 10 hours. Previously men were allowed 30 minutes preparatory time, and are now allowed an hour. The average earnings for each name on the payroll in January, 1902, was $65.30, and the average for each name on the January, 1912, payroll was $94.26. Mr. Dithridge estimated



Length of Time on Duty and Time Occupied by Firemen in Various Ways on the Pennsylvania Lines West in Freight Service, February and March, 1913.

that firemen as a whole, including yard, freight, passenger and all firemen on the Pennsylvania Lines West, are getting 42.57 per cent. more money for their services now than they would have been paid under the rates and conditions in effect at the end of 1901.

T. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West, was the next witness. He said that he had had no college education, had begun work as an apprentice in the Altoona shops, and had worked his way up through the ranks to his present position. Mr. Crawford presented statistics and diagrams to show that the effect of putting in service larger locomotives was not to increase the manual labor of the fireman. One of the diagrams introduced is shown herewith. Mr. Crawford said that in his opinion the figures which he introduced and those shown on the various diagrams, including the one shown herewith, demonstrate that there is no relation between the manual labor required from the fireman and the size of the locomotive. The following table shows a comparison of the average tractive power per locomotive in pounds; the average weight on drivers per locomotive in pounds; the average pounds of coal per locomotive mile, and the average wages paid firemen per locomotive mile in passenger service on a percentage basis, using 1910 as 100 per cent. and taking the information from 40 roads:

	Tractive power.	Weight on drivers.	Coal.	Wages.
1910.....	100.0	100.0	100.0	100.0
1911.....	103.8	104.0	101.3	104.2
1912.....	106.7	107.2	103.2	106.0

Mr. Crawford's figures showed that while the average tractive power per locomotive in passenger service had increased from 14,890 in 1900 to 22,300 in 1912; the average weight on drivers, from 65,114 in 1900 to 109,400 in 1912, and the average pounds of coal consumed per locomotive mile, from 69.6 in 1900 to 108.3 in 1912, the average wages paid firemen per locomotive mile had increased from 1.82 cents in 1900 to 2.64 cents in 1912. In freight service the average tractive power per locomotive had increased from 22,830 in 1900 to 34,743 in 1912; the average weight on drivers, from 102,630 in 1900 to 150,453 in 1912; the average pounds of coal consumed per locomotive mile, from 133 lbs. in 1900 to 195.2 lbs. in 1912, and wages per locomotive mile from 2.68 cents in 1900 to 4.26 cents in 1912. Mr. Carter asked whether if, instead of taking the average tractive power per locomotive mile they had taken the total tractive power in service, the increase in 1912 over 1900 would not have been a very much larger percentage. Mr. Crawford agreed that this was true. He said that the way his figures had been arrived at were as follows: The total tractive power of all locomotives had been divided by the total number of locomotive miles, and that the same method had been used in 1900 as in 1912. Mr. Carter tried to show that while Mr. Crawford's figures were correct insofar as being a proper exhibition of his method if he had used some other method the results would have been very different; but the witness would not admit that any other correct method could have been used. What Mr. Carter was apparently trying to show was that the percentage of increase of total tractive power was greater than the percentage of increase of total wages paid firemen. As a matter of fact, however, he did not ask the witness this question directly. Mr. Crawford submitted figures showing in detail the way in which the diagrams, similar to the one shown herewith, were compiled.

In redirect examination Mr. Crawford said that in his opinion the firemen had not contributed anything to the greater hauling power of locomotives and to the handling of the heavier tonnage in 1912 as compared with the tonnage handled in 1900. On cross examination he specifically stated that this statement was made not from the point of view of the employers, but actually as a matter of fact and of observation.

On Wednesday morning the cross examination of Mr. Crawford was completed. The questions dealt largely with the use of automatic stokers, and Mr. Crawford said that in his opinion there was no necessity whatever of having two firemen on one engine where a successful stoker was in use, regardless of the size of the engine. Men who have no knowledge of stokers are frequently called upon to fire stoker engines and have been known to make perfect records on their first trips under these conditions. The firemen have a more comfortable time where stokers are used, as the firedoor is closed during the greater part of the time and the coal dust annoyance is practically eliminated.

J. G. Walber, assistant to the third vice-president of the Baltimore & Ohio, presented detailed statistics showing the rates paid firemen for various classes of service by eastern, southeastern and western roads. In general the rates were higher for through freight service than for any other service exclusive of passenger service. The firemen asked for rates on the through freight service basis for these classes of service.

In their second amended proposition the firemen asked that firemen on all freight runs that load or unload freight, and firemen on all freight runs that set out or pick up cars, or do switching at four or more points between their initial and final terminals, be considered as in local freight, way freight, pick-up or set-out service and be paid 25 cents per day in addition to through freight rates. Mr. Lee contended that there should be no uniform rule governing all roads, and that local conditions should continue to determine this practice. Rules of a large number of roads regarding this practice were cited to show that at present they differed widely. Mr. Carter thought that a uniform rule was essential.

In their second amended proposition the firemen also asked that the following rule in regard to terminal delays be adopted: When the actual departure of any train is delayed to exceed one hour after a fireman is required to report for duty, or when a train has reached its final terminal limits and is then delayed from any cause so that the fireman is not relieved from duty within 30 minutes after having reached the final terminal limits, the firemen will be paid an additional compensation for all such delays over one hour at the initial terminal, and for all such delays over 30 minutes at the final terminal. Under this rule the fireman on a train which was due to start on a 100 mile run at 8 o'clock, but which did not start until 10 o'clock, due to unavoidable circumstances, and which arrived at its destination at 2 o'clock, where the fireman was again held 45 minutes, due to unavoidable circumstances, the fireman would be paid for a full day's work or ten hours plus one hour and fifteen minutes terminal delay. In other words he would be paid for eleven hours and fifteen minutes' work when he was only on duty six hours and forty-five minutes. Mr. Carter said that this rule was intended to penalize the roads for keeping the firemen on duty when their services were not wanted. Mr. Lee said that if the roads were to be penalized in this manner the firemen should receive less when their run of 100 miles was compelted in less than ten hours. Mr. Carter said that firemen were kept waiting at terminals when the officials knew that they would not be needed for hours. Mr. Lee said that they received pay for these waits. Mr. Carter replied that the firemen preferred not to work over ten hours a day, regardless of overpay. He said further that yardmasters frequently prevented trains from entering yards, claiming that there were no tracks available, but when those yardmasters found that the ten hour limit of the trip was approaching, they speedily found clear tracks. Mr. Carter thought that this rule would have the effect of allowing trains to enter the yards more promptly. It was shown that the Chesapeake & Ohio had adopted the practice of having the engines made ready by hostlers, so that the firemen were not needed until immediately before the train was due to leave. Mr. Carter advocated the adoption of this practice.

Under the provisions of the Erdman act a decision would be due on April 6. Both sides have, however, agreed to an extension of time and have left it with the board to decide how much more time will be needed. The board will fix a date later on.

General News.

On April 1 the general offices of the Chicago & Alton, now located in the Railway Exchange Building, will be removed to the Transportation Building, 608 South Dearborn street, Chicago.

The United States has begun suit in the federal court at Freeport, Ill., against the Illinois Central to collect penalties amounting to $6,200, for alleged failure to report violations of the hours of service law.

In New York City this week, the New York, New Haven & Hartford was fined $500 for violating the smoke ordinance. The offenses occurred some time ago in the yard at Harlem river, where electric locomotives are now being introduced.

The St. Louis & San Francisco now runs through trains, both passenger and freight, to and from New Orleans over the Yazoo & Mississippi Valley, a contract for the use of these tracks for 99 years having gone into effect on the 16th of this month. The contract covers a distance of 85 miles, the connections being made at Baton Rouge on the north, and Shrewsbury, about 5 miles from New Orleans, on the south. From Shrewsbury to the terminal in the city, the trains of the Frisco will use the tracks of the New Orleans Terminal Company, which is controlled jointly by the St. Louis & San Francisco and the Southern Railway. South of Baton Rouge the Frisco trains have run heretofore over the line of the Louisiana Railway & Navigation Company.

A special committee appointed by the Michigan legislature to investigate the financial history of the Pere Marquette has been holding sessions at Detroit. F. W. Stevens, formerly general counsel of the road, and now connected with J. P. Morgan & Co., produced statements showing that increases in wages, in cost of materials, and in interest and rental charges, had caused a deficit of $1,800,000 in 1911, and a slightly larger deficit in 1912, after the company had earned a surplus of $469,000 in 1910. He said that the wage increase alone in 1911, as compared with 1910, amounted to $1,022,000; that the gross earnings decreased $18,000, and the higher prices of materials cost the company $492,000. He also stated that proposed legislation now pending in the legislature, if enacted, would cost the road $818,000 annually, without giving it anything in return, and that the Michigan legislature had been particularly active in passing laws to increase the road's "cost of living." Even if the Interstate Commerce Commission had allowed the proposed advance in rates in 1910, the Pere Marquette would have received only $500,000 in increased revenue per year.

Large Capacity Wrecking Crane.

In an article describing a wrecking crane used on the Norfolk & Western in our issue of March 14, the weight in working condition was incorrectly stated. It should read 123 tons.

Law Against Stealing from Cars.

One of the measures recently passed by Congress makes it a felony to break the seal of a railroad car containing interstate or foreign shipments of freight, express or baggage, or to enter such a car with intent to steal, or to steal, conceal or by fraud or deception obtain from any railroad car, station-house, depot or platform any goods or chattels which are part of an interstate or foreign shipment of freight, express or baggage. Breaking into or stealing any part of the contents of a piece of baggage also comes under the provisions of the act, which applies with equal force to any person who shall buy, receive or have in his possession any freight, express, baggage or other goods or chattels so stolen, knowing the same to be stolen. The punishment for any of these offenses is a fine up to five thousand dollars or imprisonment up to ten years, or both, and prosecutions may be instituted in any district where the crime shall have been committed.

The carrying or transporting by a person of any such freight, express, baggage or goods or chattels from one state or territory into another, knowing it to have been stolen, constitutes a separate offense for which the same punishment is prescribed. Prosecutions for such transporting of stolen property may be instituted in any district into which the goods or chattels may have been removed or into which they may have been brought.

The making of these acts federal offenses, together with the severity of the punishment provided, is expected to prevent much crime of this character, as all offenders have a wholesome fear of United States courts and the promptness and certainty with which they mete out punishment.

Report on Gothenburg Collision.

The board of inquiry appointed by the Union Pacific to investigate the rear collision at Gothenburg, Nebraska, March 14, between train No. 12, the Denver Special, and train No. 4, the Atlantic Express, which caused the death of four persons, and injury to several others, has submitted a report placing the responsibility for the accident. The board finds that at the time of the accident an extraordinary and unusual blizzard prevailed in the vicinity; that the safety appliances were operating perfectly at the time; and that the cause of the accident was the failure of the engineer, John Weinberger, of train No. 12, to properly observe the signals and place his train under control, when passing the second block signal west of Gothenburg, the distant signal, and the failure to stop at the block signal located 1,100 ft. west of the point of the accident. The report is signed by Charles Ware, general manager, and W. R. Cahill, superintendent of the Union Pacific, and by the general manager of the Gothenburg Telephone Company, and the cashier of the Gothenburg National Bank. Train No. 4 had stopped at the water tank near Gothenburg when it was struck by No. 12, which, according to the testimony of the conductor, was going at the rate of about 10 miles an hour, having slowed down at the caution signal. The coroner's jury which investigated the accident reported that the collision was due to the very unusual severity of the storm, making the observation of signals very difficult.

Proposed New York-New Jersey Bridge.

The Interstate Bridge and Tunnel Commissioners appointed jointly by the authorities of New York and New Jersey have made a report of their doings for the past year; and they propose a bridge across the Hudson River from 58th street, New York City, to Weehawken, N. J., the central span of which is to be 2,880 ft. long. The eastern terminus of the proposed bridge would be near the south end of Central Park. Three miles south of here, at Canal street, there would be the New York terminus of a tunnel, for wagon traffic, beneath the river, which also is proposed by the commission. Preliminary plans and estimates for the bridge have been made by Boller, Hodge & Baird, of New York City, and estimates of the cost of the tunnel have been made by Jacobs & Davies, of New York. The engineers estimate that the bridge would cost twenty-nine millions, to which would be added five millions for land, five millions for interest charges and three millions for engineering and contingencies, a total of $42,000,000.

The length of the bridge entire would be 8,300 ft. It is proposed to carry all of the traffic on one level; two driveways, two tracks for subway railroads, two for elevated railroads, and two for surface street cars. The plan calls for a bridge 170 ft. above the surface of the river, which is 35 ft. higher than any of the bridges across the East river; and the towers supporting the main span would be 545 ft. high.

Railway Legislation.

The Oklahoma legislature has passed a full crew law. It provides that freight trains of thirty cars or more shall have three brakemen.

Fines aggregating $4,300 have been assessed against eight railways in Indiana for violations of the safety appliance act and the ash pan act.

The governor of Missouri has approved the bill passed by the legislature abolishing the railroad and warehouse commission, and creating the office of state warehouse commissioner. It is announced that Commissioner Bradshaw will be appointed to the office of warehouse commissioner, and that Commissioners Knott and Wightman will be made members of the new utilities commission for the period of their unexpired terms on the railway commission.

The Missouri legislature has passed a senate bill providing that no railroad corporation, rail, steam, street, electric, trans-

fer or terminal, except those incorporated and chartered in and under the laws of Missouri, shall be authorized or permitted to carry passengers or freight of any kind between points within the state, under a penalty of from $2,000 to $10,000 for each violation. As mentioned in last week's issue, the house passed a bill for similar purposes, but it has since concurred in the senate bill as noted above.

Disastrous Floods in the Central West.

Abnormal weather conditions throughout the central and western states during the past week have caused hundreds of deaths and destroyed many millions of property. A tornado in Nebraska, which did great damage in the western part of Omaha, wrecked buildings in that city on Sunday by the hundred and resulted in over two hundred deaths and many injuries. This was followed on Monday and Tuesday by heavy rains, causing floods in Illinois, Indiana, Ohio, and western Pennsylvania. The governor of Ohio reported that that state had suffered the worst disaster in its history, and including the floods, fires and deaths in Indiana he believed it would be the greatest tragedy in the history of the republic. From the brief and inconclusive reports published up to the time of going to press, we make the following notes:

Dayton, Ohio, was flooded throughout the business section of the city, and the deaths were estimated all the way from two to five thousand. The flood was followed by great fires.

Columbus, Ohio, suffered enormous damage and railroad traffic was almost completely suspended early on Tuesday. The bridge over the Miami river at Middletown, Ohio, fell. At Louisville, Ky., great damage was done by wind, as well as by rain, the wind blowing at sixty miles an hour.

At Makanda, Ill., a freight train of the Illinois Central was blown off the track. At Delaware, Ohio, twenty or more persons were reported drowned as a result of the flood. Bridges were washed out in hundreds of places throughout the flood district.

A passenger train of the Pennsylvania lines was caught between two floods at West Liberty, Ohio, and one sleeping car fell into the Mad river, but the passengers all escaped with slight injuries, the train having been running at very low speed.

Fort Wayne, Ind., had the highest water in twenty years. Peru, Ind., was submerged throughout the business section of the city, and the number of deaths was estimated at 300.

A passenger train of the Cleveland, Cincinnati, Chicago & St. Louis was derailed at a washout near St. Paul, Ind. A freight train of the Wheeling & Lake Erie was derailed at a trestle bridge near Wellington, Ohio, and the engineman, fireman and one brakeman were killed.

Every creek and river in the state of Indiana was reported as overflowing, and the same was true in Ohio except in the northern part. The property loss in these two states was estimated at scores of millions. The people who were driven out of their homes in the principal cities of Indiana and Ohio were numbered by hundreds of thousands.

The Lake Shore & Michigan Southern was not seriously affected, but no line between this and the Ohio river was open to Chicago. All other lines had to send their passengers and perishable freight over the Lake Shore. The Pennsylvania was open from Pittsburgh to Alliance and from Pittsburgh to Dennison. The Norfolk & Western was reported on Thursday as open from the Ohio river to Columbus. By reason of the almost complete paralysis of telegraph and telephone lines scores of towns had not been heard from, on Thursday morning. Numerous despatches have contained estimates of losses of railway bridges and roadbeds aggregating many millions of dollars, but none of them can be confirmed.

Switchmen's Wage Controversy Under Mediation.

A dispute between the 19 roads serving the Chicago district, and yardmen, members of the Brotherhood of Railway Trainmen, who have made demands for a new scale of wages, and a revision of working conditions, has been submitted to mediation under the Erdman law by Acting Commissioner of Labor G. W. Hanger, and Martin A. Knapp, presiding judge of the Commerce Court. Mr. Hanger arrived in Chicago on Sunday, and at once went into conference with two committees. The demands of the men include time and one-half for overtime, Sundays and holidays, continuous time and one hour penalty for failure to give 30 minutes for meal time, semi-monthly pay, one day's pay if called and not used and pay for time consumed in investigations. The switchmen were represented by a committee headed by Vice-President Whitney of the Brotherhood of Railway Trainmen, and the roads by a committee of managers, of which T. J. Foley, general manager of the Illinois Central, is chairman.

Following the failure of negotiations with the managers a strike vote was announced on March 20, and conferences were resumed. The managers' committee proposed that the men withdraw the items involving payment of time and one-half and that the investigations be continued as to the remaining rules with a view to affecting a settlement by mutual concessions. When this proposal was declined by the brotherhood committee the managers proposed the calling in of mediators, which was accepted. The managers have published as an advertisement in the newspapers, a letter to Vice-President Whitney, which includes the following:

"Your request for time and one-half for overtime and for Sundays and holidays is declined, because it would penalize the roads for conditions they cannot prevent. The principle of time and one-half for overtime for Sundays and holidays for yardmen is wrong, for the reason that it cannot accomplish the purpose for which you intended it, i. e., elimination of overtime. The establishment of such a high rate for overtime would be an incentive for men to work longer hours, and it would result in increasing rather than decreasing the men's day. It cannot be contradicted that a certain amount of yard work must be performed Sundays and holidays, and railroads do not receive any greater compensation for traffic handled on those days than at any other time, and therefore would not be justified in increasing the rates for such days."

Western Railway Club.

A special meeting of the Western Railway Club was held in the Assembly room of the Karpen building, Chicago, on Tuesday evening, March 25, to consider the report of the committee appointed to suggest necessary changes in the rules of interchange. The proposed changes are to be submitted to the arbitration committee of the Master Car Builders' Association.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 20, Chicago.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Annual meeting, June 17-20, Buffalo, N. Y.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, May 21, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-23, 1913, Montreal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Convention, June 11-13, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 20-22, 1914, New Orleans, La.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago. Next meeting, May, 1913, Baltimore, Md.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June, 1913, Atlantic City, N. J.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y. Annual meeting, October 8, Philadelphia, Pa.

Bridge and Building Supply Men's Association.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.
Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.
Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
Engineers' Society of Western Pennsylvania.—E. K. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
Freight Claim Association.—Warren P. Taylor, Richmond, Va. Next convention, June 18, Bluff Point, N. Y.
General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
International Railway Fuel Association.—C. G. Hall, 922 McCormick building, Chicago. Annual meeting, May 21-24, Chicago.
International Railway General Foremen's Association.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 22-25, Chicago.
International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Annual meeting, August 18, Richmond, Va.
Maintenance of Way Master Painters' Association of the United States and Canada.—W. G. Wilson, Lehigh Valley, Easton, Pa.
Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.
Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Convention, June 16-18, Atlantic City, N. J.
Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Annual meeting, September 9-12, Ottawa, Can.
National Railway Appliance Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
New England Railroad Club.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
Northern Railroad Club.—C. L. Kennedy, C., M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Thursday.
Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
Railway Business Association.—Frank W. Noxom, 2 Rector St., New York. Annual dinner, second week in December, 1913, New York.
Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo. Next meeting, August 12-15, Nashville, Tenn.
Railway Development Association.—W. Nicholson, Kansas City, Southern, Kansas City, Mo.
Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Meetings, June 10-14, New York; convention, October 14, Nashville, Tenn.
Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Annual convention, May 19-21, Chicago.
Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.
Railway Tel. and Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.
Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Convention, September 8-12, 1913, Chicago.
St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.
Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Next meeting, April 17, Atlanta, Ga.
Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.
Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
Traffic Club of St. Louis.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.
Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago. Annual meeting, June 17, Los Angeles, Cal.
Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, August, 1913, Chicago.
Utah Society of Engineers.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.
Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
Western Society of Engineers.—J. H. Warder, 1735 Monadnock block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The spring meeting of the National Industrial Traffic League will be held at the Iroquois hotel, Buffalo, N. Y., on Tuesday, April 15. A number of important subjects will come before the meeting and a large attendance is expected.

The Secretary of Agriculture has declared a quarantine against interstate traffic in Parlatoria scale and Phoenicococcus; but only from certain counties in southern California, in Arizona and in Texas. These things are insects which do damage to date palms. All shipments of date palms from the territory named must be inspected by government inspectors.

Eight wholesale liquor dealers of Winthrop, Mo., across the Missouri river from Atchison, Kan., have been notified by the railroad and express companies that they will accept no shipments of liquor consigned to Kansas points. This action was taken as a result of the enforcement of the new federal liquor traffic law in Kansas. This is expected to put the Winthrop dealers out of business, as they have been selling most of their output in Kansas.

On Sunday, March 23, the Illinois Central and the Nashville, Chattanooga & St. Louis re-established their former fast freight train No. 51 from Chicago to Nashville, Chattanooga, Atlanta and other southeastern points. This train will carry principally perishable freight, through merchandise cars and other high class tonnage. The time will be 50 hours Chicago to Atlanta, which, for the distance, 850 miles, makes it practically the fastest long distance freight service in the world. The route will be via Cairo, Ill., and Martin, Tenn. The schedule provides for leaving Chicago at 11:00 p. m. daily; Martin at 12:30 a. m. second day; Nashville, at 7:45 a. m. second day; Chattanooga, at 5:45 p. m. second day; arriving at Atlanta at 1:30 a. m. third day.

"Salmon Day," March 14, was celebrated this year for the first time. Throughout the northwestern states, and to some extent in other parts of the country, it is declared by its promoters to have been a great success; and they propose to do the same thing again next year. About forty railroads are represented in Seattle, the center of the salmon industry, and all of these lines joined in the movement, and had salmon served on their dining cars. The northern transcontinental lines served portions of the fish to diners free on that day. J. M. Norton, general agent of the Missouri Pacific, at Seattle, was chairman of the committee, and the Seattle Transportation Club, of which he is one of the prominent members, gave a dinner to the salmon packers, at which 300 guests assembled.

The Southern Railway has appointed two assistant live stock agents. They are to assist and instruct the farmers of the southern states in raising beef cattle and other animals, in the most successful way. Dr. Walter Farrell is to be stationed at Greensboro, N. C., and Dr. C. D. Lowe at Chattanooga, Tenn. Both have had years of experience in animal husbandry and have been in the service of the United States government. It looks as though railroad functions and railroad nomenclature were in danger of becoming very much confused. Ordinarily, the live stock agent of a railroad has been supposed to devote his energies mainly to hastening the death of animals, that is, in getting them to the slaughterhouse; but these men, with the selfsame title, are going to promote the life and happiness of the animals on the farms which they visit. What conflicting emotions must agitate the breast of a steer, when he sees the "agent" coming!

Traffic Club of Chicago.

At the annual election of the Traffic Club of Chicago, Tuesday evening, March 25, the following were elected as officers for the ensuing year: President, Guy S. McCabe, general western freight agent, Pennsylvania Company; first vice-president, W. M. Hopkins, manager traffic department, Chicago Board of Trade; second vice-president, Frank W. Smith, member, Uniform Classification Committee; third vice-president, L. Richards, traffic manager, Quaker Oats Company; secretary, W. H. Wharton, commercial agent, Nashville, Chattanooga & St. Louis; treasurer, Charles B. Hopper, general freight agent, Goodrich Transit

Company; directors for two years: C. E. Finch, general agent American Express Company; V. D. Fort, assistant freight traffic manager, Illinois Central; H. K. McEvoy, assistant general passenger agent, Chicago & Alton; F. B. Montgomery, traffic manager, International Harvester Company.

Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 139-A, giving a summary of car surpluses and shortages by groups from December 6, 1911, to March 15, 1913, says: The total surplus on March 15 was 57,998 cars; on March 1, 1913, 58,529 cars; and on March 13, 1912, 46,028 cars.

Compared with the preceding period; there is a decrease in the total surplus of 531 cars, of which 1,735 is in flat, 172 in coal, 289 in miscellaneous, and an increase of 1,665 box cars. The increase in box car surplus is in all groups, except, 4 (the Virginias and Carolinas), 7 (Montana, Wyoming, Nebraska and the Dakotas), 8 (Kansas, Colorado, Oklahoma, Missouri and Arkansas), and 11 (Canadian Lines). The decrease in flat car surplus is general, except in groups 2 (New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania), and 5 Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida. The decrease in coal car surplus is shown in groups 3 (Ohio, Indiana, Michigan and Western Pennsylvania), 5 (as above), 6 (Iowa, Illinois, Wisconsin and Minnesota), 9 (Texas, Louisiana and New Mexico), and 10 (Washington, Oregon, Idaho, California, Nevada and Arizona). The decrease in miscellaneous car surplus is shown in groups 2, 4, 5, 7, 9, 10 and 11 (as above).

The total shortage on March 15, 1913, was 20,223 cars; on March 1, 1913, 27,148 cars; and on March 13, 1912, 42,985 cars

Compared with the preceding period; there is a decrease in the total shortage of 6,925 cars, of which 4,994 is in box, 1,767 in flat, 585 in miscellaneous, and an increase of 421 coal car shortage. The decrease in box car shortage prevails in all groups, except 4 and 11 (as above). The decrease in flat car shortage is shown in groups 2, 3, 4, 6 and 8 (as above). The increase in coal car shortage is shown in groups 3, 5, 6 and 9 (as above). The decrease in miscellaneous car shortage is shown in groups 1 (New England Lines), 3, 5, 6 and 8 as above.

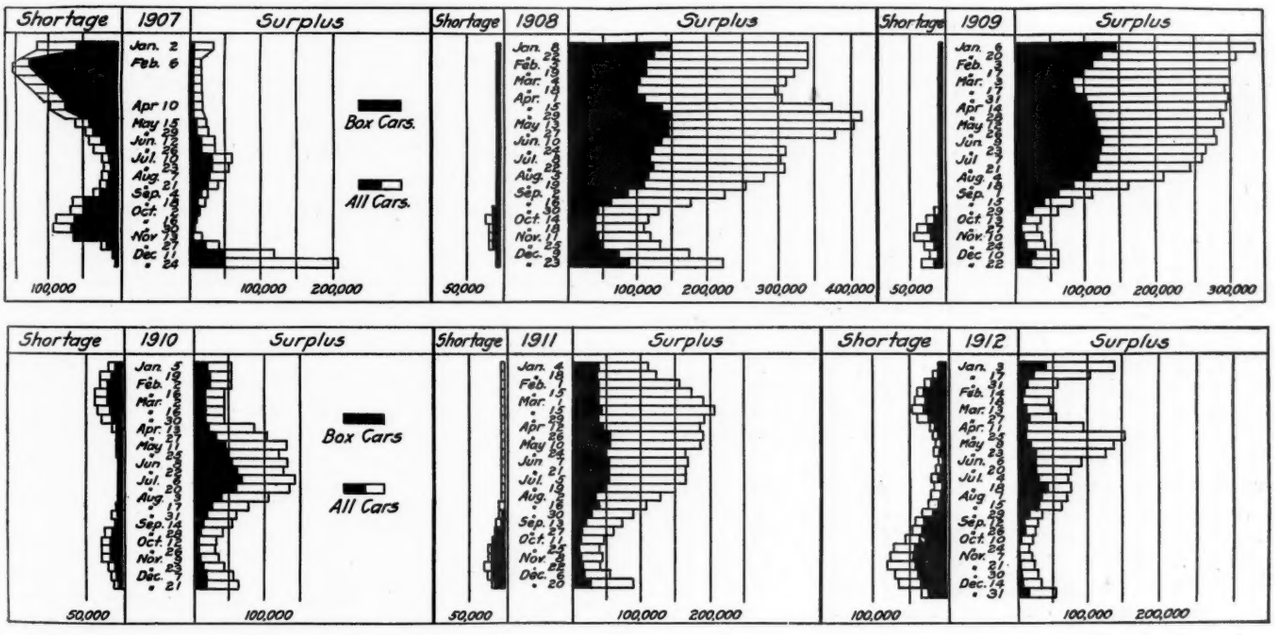
Compared with the same date of 1912; there is an increase in the total surplus of 11,970 cars, of which 4,722 is in box, 8,023 in coal, 2,311 miscellaneous, and an increase of 3,086 flat car surplus. There is a decrease in the total shortage of 22,762 cars, of which 12,938 is in box, 7,933 in coal, 2,846 in miscellaneous, and an increase of 955 flat cars.

The accompanying table gives car surplus and shortage figures

CAR SURPLUSES AND SHORTAGES.

Date.	No. of roads.	Surpluses Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—March 15, 1913	7	50	0	79	7	136	457	159	0	577	1,193
" 2.— " 15, 1913	35	1,113	71	3,279	238	4,701	152	0	1,654	15	1,821
" 3.— " 15, 1913	32	328	530	3,434	1,824	6,116	1,813	13	260	539	2,625
" 4.— " 15, 1913	11	4,162	84	1,004	594	5,844	1,297	516	462	58	2,333
" 5.— " 15, 1913	26	155	17	683	600	1,455	2,564	539	835	56	3,994
" 6.— " 15, 1913	31	2,276	267	2,099	3,456	8,098	2,653	205	496	129	3,483
" 7.— " 15, 1913	6	54	29	764	608	1,455	60	0	40	0	100
" 8.— " 15, 1913	19	1,817	230	3,026	3,004	8,077	149	6	0	38	193
" 9.— " 15, 1913	15	2,893	224	438	634	4,189	0	16	6	37	59
" 10.— " 15, 1913	25	4,288	1,226	3,061	8,024	16,599	387	32	23	212	654
" 11.— " 15, 1913	7	496	237	0	595	1,328	3,119	370	0	279	3,768
Total	214	17,632	2,915	17,867	19,584	57,998	12,651	1,856	3,776	1,940	20,223

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages, 1907 to 1913.

by groups for the last period covered in the report, and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1913.

Car Location.

The accompanying table, which is taken from the car location bulletin No. 4 of the American Railway Association, gives a summary of freight car location by groups on March 1, together with surpluses and shortages on the same date.

CAR LOCATION ON MARCH 1, 1913.

	New England.	N.Y., N.J., Del., Md., Eastern Pa.	Ohio, Ind., Mich., Western Pa.	Va., W. Va., No. & So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minn.	Mont., Wyo., Neb., Dakotas.	Kans., Colo., Okla., Mo., Ark.	Texas, La., New Mexico.	Oregon, Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Total Cars Owned	90,412	677,408	284,157	200,090	171,967	471,526	16,092	149,730	30,807	129,856	129,695	2,351,680
Home Cars on Home Roads	44,557	351,118	90,081	103,862	72,691	283,920	3,162	67,106	13,150	65,421	80,300	1,175,368
Home Cars on Foreign Roads	45,855	326,290	194,076	96,228	99,216	187,606	12,930	82,624	17,657	64,435	49,395	1,176,312
Foreign Cars on Home Roads	56,023	314,381	211,715	101,770	88,997	207,959	12,009	78,703	25,290	64,135	62,974	1,223,956
Total Cars on Line	100,580	665,499	301,796	205,632	161,688	491,879	15,171	145,809	38,440	129,556	143,274	2,399,324
Excess or Deficiency	10,168	*11,909	17,639	5,542	*10,219	20,353	*921	*3,921	7,633	*300	13,579	47,644
Surplus	145	4,142	4,945	7,501	2,221	8,880	1,737	6,537	3,738	17,651	1,421	58,918
Shortage	1,727	4,608	4,259	2,078	3,896	5,632	212	572	71	872	3,221	27,148
Shop Cars—												
Home Cars in Home Shops	5,812	26,629	15,383	9,081	10,514	21,448	407	7,996	1,551	4,163	4,110	107,094
Foreign Cars in Home Shops	825	8,041	6,508	2,451	2,517	5,538	579	2,364	1,037	2,634	689	33,183
Total Cars in Shop	6,637	34,670	21,891	11,532	13,031	26,986	986	10,360	2,588	6,797	4,799	140,277
Per Cent. to Total Cars Owned—												
Home Cars on Home Roads	49.28	51.83	31.70	51.91	42.29	60.21	19.65	44.82	42.69	50.38	61.91	49.98
Total Cars on Line	109.21	98.24	106.09	102.77	94.06	104.32	94.28	94.78	124.78	99.77	110.47	102.03
Home Cars in Home Shops	5.81	3.93	5.41	4.54	6.12	4.85	2.53	5.34	5.03	3.20	3.17	4.61
Foreign Cars in Home Shops	.91	1.19	2.29	1.22	1.46	1.25	3.60	1.47	3.37	2.03	.53	1.43
Total Cars in Shops	6.72	5.12	7.70	5.76	7.58	6.10	6.13	6.81	8.40	5.23	3.70	6.04

*Denotes deficiency.

INTERSTATE COMMERCE COMMISSION.

The commission has suspended from March 20 until September 20 certain schedules in Agent F. W. Gomph's tariff, which contain increased rates for the transportation of tin cans and other commodities between points in the State of California and interstate points.

The commission has suspended from March 25 until September 20 the supplement to the tariff of the Union Pacific, which contains increased rates for the transportation of plaster, gypsum rock, stucco and plaster board from Blue Rapids and Irving, Kan., to interstate points.

The commission has suspended until July 8 certain tariffs, which name similar increased rates for the transportation of grain and grain products from points in Illinois to interstate points as are named in other tariffs previously suspended by order issued in same docket.

The commission has suspended from March 19 until July 17 the schedules in certain tariffs which proposed to increase rates for the transportation of cement, in carloads, from Iola, Kan., and other points in what is known as the Gas Belt district to Memphis, Tenn., 6 cents per 100 lbs.

The commission has suspended from March 25 until July 8 the operation of the supplement to the tariff of the Chesapeake & Ohio, which contains advances in rates for the transportation of grain and grain products similar to those suspended by previous orders in the same docket.

The commission has suspended until July 19 the items in certain tariffs, which advance from 7 to 19 cents per 100 lbs. rates for the transportation of fresh meats in carloads, from St. Louis, Omaha and other points to Oklahoma. As an example, the present rate from Omaha to Chickasha is 66 cents and the proposed rate 85 cents per 100 lbs.

The commission has suspended from March 25 until July 23 the schedules contained in a supplement to the tariff of the Chesapeake & Ohio, which cancel through rates on coal, in carloads, from mines in Kentucky and West Virginia to Milwaukee, Wis., via the Grand Trunk and car ferry across Lake Michigan, leaving no through rates in effect via this route.

The commission has suspended until July 12 the schedules in certain tariffs, which proposed to cancel the absorption by certain roads entering Chicago of lighterage and floatage charges of three cents per 100 lbs. on carload and five cents per 100 lbs. on less than carload traffic handled by the Chicago River & Indiana lighterage and float service to and from points on the Chicago river front.

The commission has suspended from March 22 until July 19 the schedules in a supplement to the tariff of the Southern Pacific, which propose to advance rates for the transportation of lumber from points in California to stations in Nevada by the cancellation of established commodity rates and the application of class rates. The proposed rate from New Castle, Cal., to Verdi, Nev., is $5.40 per net ton and the present rate is $2 per net ton, making an increase of $3.40 per net ton. Other points are affected in a like manner.

The commission has suspended from March 25 until September 25 the operation of the schedules contained in a supplement to the tariff of the Kanawha & Michigan, which propose to cancel through rates applying to the transportation of coal in carloads, from mines in Kentucky and West Virginia to Milwaukee, Wis., and other points via Ludington, Mich., and Pere Marquette car ferry.

Complaints concerning westbound rates on freight imported at Boston, New York, Philadelphia and Baltimore are again under investigation by the Interstate Commerce Commission, and a hearing was held at Washington on Tuesday of this week. Mr. Ives, speaking for Boston, claimed that under the present adjustment, Baltimore is getting an increased share of import traffic, while Boston is suffering a decrease.

The commission has suspended from March 25 until July 23 the schedules contained in a supplement to Agent F. A. Leland's tariff, which cancel through rates applicable to the transportation of lumber from points located on the Fourche River Valley & Indian Territory Railroad in Arkansas to points in Oklahoma which were established, effective January 1, 1913, in compliance with an order of the commission in the Tap Line case.

The commission has issued an order, the answers to which are wanted by April 30, calling for information, so far as it can be had from the railroad companies' accounts, showing operating expenses divided as between passenger service and freight service. The totals for the year ending June 30, 1912, are preferred; but any other twelve months will answer, if that year be not available. This part of the commission's work is in the charge of Commissioner Meyer; and it is said that he will be in charge of the work of valuation of railways, under the new law.

Two Thousand Complaints.

Sixty different railroad companies are represented in the reports of violations of the hours of service act which the Interstate Commerce Commission has transmitted to the United States district attorneys since June 30, 1912. Each report is accompanied by a recommendation that the companies be prosecuted for disobedience of the law. In these sixty cases the aggregate number of counts is 2,127.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1913.—CONTINUED FROM *Railway Age Gazette* OF MARCH 14, PAGE 522.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
St. Louis, Iron Mountain & Southern	3,318*ff*	$2,210,382	$538,250	$2,928,999	$381,345	$402,026	$54,837	$963,811	$70,216	$1,872,235	$1,056,764	—$5,707	$88,695	$962,362	$305,894
St. Louis Merchants' Bridge Terminal	9	.....	393	179,016	25,311	11,776	790	98,019	5,771	141,667	37,349	.....	5,600	31,749	11,231
St. Louis, San Francisco & Texas	244	99,906	28,807	135,870	18,126	15,662	2,504	55,871	5,512	97,675	38,195	.....	1,225	36,970	25,195
St. Louis Southwestern of Texas	703	267,207	81,967	378,303	87,431	84,235	17,158	177,698	22,813	389,335	—11,032	—238	11,229	—22,499	—45,357
San Antonio & Aransas Pass	727	254,515	102,550	378,002	66,832	59,225	6,722	190,209	11,611	334,599	43,403	.....	12,000	31,403	511
San Pedro, Los Angeles & Salt Lake	1,135*gg*	525,539	256,378	839,844	90,639	163,347	28,880	295,575	19,209	597,650	242,194	—2,215	34,000	205,979	173,824
Seaboard	3,070*hh*	1,481,956	447,253	2,164,511	288,413	288,138	65,593	806,988	50,566	1,493,698	670,813	—2,285	81,000	587,528	280,719
Southern	7,036[25]	3,651,681	1,462,023	5,547,839	812,581	970,623	182,899	2,081,960	172,083	4,220,146	1,327,693	19,743	212,303	1,135,133	116,966
Southern in Mississippi	281	61,252	35,055	105,030	29,607	10,947	2,702	50,197	4,440	97,893	7,137	.....	8,180	—1,043	—9,558
Southern Kansas Ry. of Texas	125	87,680	16,980	108,896	10,465	25,346	2,412	38,140	3,846	80,209	28,687	.....	2,328	26,359	32,367
Southern Pacific Co.	6,323*ii*	3,891,948	2,512,330	6,904,362	874,333	1,096,199	170,289	2,347,777	234,520	4,723,118	2,181,244	129,741	373,491	1,937,494	115,345
Spokane, Portland & Seattle	556*jj*	319,001	108,133	496,613	54,236	40,438	6,280	125,833	12,701	239,488	257,125	—124	53,400	203,601	132,160
Tennessee Central	294	91,237	29,773	128,970	26,004	16,028	5,329	46,152	7,310	100,823	28,147	.....	4,264	23,883	22,955
Terminal R. R. Ass'n of St. Louis	34*kk*	.....	285	253,342	41,063	18,873	968	105,948	5,574	172,426	80,916	11,073	26,596	65,393	18,266
Texas & New Orleans	458	222,911	94,990	339,831	76,843	80,721	9,193	143,842	15,582	326,181	13,650	—11,779	12,672	—10,801	—6,352
Texas & Pacific	1,885	1,046,499	353,406	1,488,306	139,975	243,313	32,771	744,930	50,647	1,211,636	276,670	—838	51,704	224,128	—19,833
Toledo & Ohio Central	443	355,818	50,012	423,708	64,920	101,330	6,599	177,522	9,103	359,474	64,234	—826	21,737	41,671	—15,564
Toledo, Peoria & Western	248	79,156	37,114	122,657	19,725	27,090	2,363	48,418	3,529	101,125	21,532	.....	5,900	15,632	—4,236
Toledo, St. Louis & Western	451	344,192	25,156	390,528	24,592	40,657	14,594	150,892	9,220	239,955	150,573	.....	14,800	135,773	72,117
Trinity & Brazos Valley	463	186,076	38,257	235,690	41,353	35,705	10,583	150,329	12,053	250,023	—14,333	.....	3,500	—17,833	—16,141
Union Pacific	3,575[26]	2,554,259	755,376	3,702,168	466,556	573,702	96,869	1,216,427	118,674	2,472,228	1,229,940	—8,461	168,271	1,053,208	303,835
Union R. R. of Baltimore	9	134,944	21,797	158,517	8,213	.....	958	5,585	2,635	17,391	141,126	.....	5,527	135,599	36,186
Union R. R. of Pennsylvania	31	.....	.....	287,320	25,570	90,057	100	144,577	2,803	263,107	24,213	4,527	8,500	20,240	33,572
Vandalia	827	655,271	193,186	950,103	114,127	206,762	25,217	383,073	19,260	748,439	201,664	.....	30,359	171,305	22,280
Vicksburg, Shreveport & Pacific	171	86,922	40,841	141,040	28,674	25,944	3,787	50,091	5,498	113,994	27,046	—344	6,900	19,802	—1,503
Virginia & Southwestern	240	136,304	13,250	153,729	24,807	34,856	1,833	42,722	3,598	107,816	45,913	.....	5,500	40,413	—2,393
Virginian	503*ll*	564,105	25,087	602,399	68,879	106,104	5,326	132,089	9,140	321,538	280,861	4,201	17,600	267,462	117,413
Wabash	2,515	1,705,094	530,035	2,425,020	264,475	439,311	90,819	1,197,809	69,578	2,061,992	363,028	—2,844	78,950	281,234	—38,559
Washington Southern	36	38,045	43,716	112,500	14,550	15,172	1,330	46,818	2,864	80,734	31,766	—269	3,290	28,207	3,823
West Jersey & Seashore	356	136,350	196,630	359,702	90,967	68,114	10,900	210,932	12,470	393,383	—33,681	—6,341	27,600	—67,622	—52,904
Western Maryland	543	554,334	56,154	649,142	71,992	92,318	16,295	309,578	12,501	502,684	146,458	.....	20,000	126,458	7,591
Western Pacific	937	300,802	70,705	382,821	73,915	43,380	23,410	192,292	26,837	359,834	22,987	—2,088	25,601	—4,702	32,311
Western Ry. of Alabama	133	70,271	49,990	129,809	23,080	24,014	6,393	34,072	5,636	93,195	36,614	63	4,795	31,882	11,545
Wheeling & Lake Erie	459[27]	489,834	49,446	575,325	63,657	129,613	7,838	220,534	19,759	441,401	133,924	5,217	29,671	109,470	—27,874
Yazoo & Mississippi Valley	1,374	636,410	233,703	941,285	166,719	141,656	14,662	389,154	24,455	736,646	204,639	225	37,000	167,864	158,343
SEVEN MONTHS OF FISCAL YEAR, 1913.															
Alabama & Vicksburg	143	$724,927	$304,303	$1,101,993	$162,264	$191,599	$25,531	$377,263	$39,944	$796,601	$305,392	—$1,303	$43,086	$261,003	$39,647
Alabama Great Southern	309	2,004,658	799,568	3,069,150	356,445	661,834	89,890	958,908	66,025	2,133,102	936,048	—3,756	102,834	829,458	64,061
Ann Arbor	292	814,795	351,877	1,249,046	162,900	160,527	29,552	439,118	53,006	845,103	403,943	289	97,509	306,723	—54,675
Arizona Eastern	366	1,272,782	263,843	1,520,766	153,868	107,165	17,664	381,540	63,499	723,736	797,030	589	56,942	740,677	305,137
Atchison, Topeka & Santa Fe	8,205[1]	39,486,403	15,185,989	59,056,020	9,957,169	9,822,502	1,191,926	16,711,838	1,142,514	38,825,949	20,230,071	.....	2,379,334	17,850,737	2,252,145
Atlanta & West Point	93	377,419	300,573	750,368	93,856	133,093	38,571	241,561	35,506	542,592	207,776	1,173	44,408	164,541	—23,982
Atlanta, Birmingham & Atlantic	645[2]	1,389,706	417,888	1,932,113	316,066	299,863	110,809	759,362	81,406	1,567,506	364,607	.....	94,475	270,132	—159,597
Atlantic & St. Lawrence	167	686,070	198,945	961,148	188,035	154,530	31,678	487,313	26,543	888,099	73,049	.....	68,873	4,176	24,535
Atlantic City	167	453,565	848,791	1,378,888	213,321	93,644	20,164	688,777	10,583	1,026,489	352,399	—26,064	63,000	263,335	—63,083
Atlantic Coast Line	4,612[3]	13,600,011	5,128,101	20,233,589	2,811,873	3,191,292	358,129	7,169,868	530,856	14,062,018	6,171,571	.....	875,000	5,296,571	—28,948
Baltimore & Ohio Chicago Terminal	77	.....	14,719	1,082,246	156,856	165,232	5,060	486,320	31,517	644,985	237,261	6,212	133,807	109,666	56,157
Baltimore & Ohio—System	4,455*a*	47,891,142	952,637	60,853,343	8,304,585	10,648,947	1,149,643	21,460,485	1,165,440	42,729,100	18,124,243	—521,283	1,618,487	15,984,473	1,810,828
Bangor & Aroostook	631[4]	1,307,980	396,334	1,810,398	325,662	219,580	24,219	574,591	84,820	1,228,872	581,526	.....	73,500	508,026	—126,785
Belt Ry. Co. of Chicago	21	.....	.....	1,877,773	115,600	243,583	3,488	788,178	39,511	1,190,360	687,413	.....	54,662	632,751	62,496
Bessemer & Lake Erie	204	5,184,224	233,424	5,495,181	565,840	941,638	66,505	1,300,861	80,356	2,955,200	2,539,981	.....	78,000	2,461,981	235,516
Boston & Maine	2,244	17,117,644	10,061,450	29,389,405	3,521,262	4,386,074	244,622	13,521,018	705,172	22,378,148	7,011,257	106,448	1,255,943	5,861,762	399,621
Buffalo & Susquehanna *R. R.*	265	966,671	61,025	1,057,664	207,375	152,640	8,505	359,203	41,364	769,087	288,577	.....	15,400	273,177	73,518
Buffalo & Susquehanna *Ry.*	91	293,447	70,656	381,425	78,782	190,097	3,313	157,677	18,586	450,455	—69,030	125	10,700	—79,605	—31,596
Buffalo, Rochester & Pittsburgh	574[5]	5,537,999	700,783	6,486,134	953,932	1,276,854	82,901	2,080,217	129,996	4,523,900	1,962,234	—2,040	121,000	1,839,194	135,048
Butte, Anaconda & Pacific	46	614,760	84,053	767,080	100,433	152,787	5,276	371,854	21,086	651,436	115,644	.....	14,639	101,005	—27,542
Canadian Pacific Lines in Maine	233	475,445	187,783	719,303	221,407	100,166	41,413	311,996	34,901	709,883	9,420	.....	70,000	—60,580	—42,604
Carolina, Clinchfield & Ohio	238	1,294,847	110,574	1,435,674	97,063	145,002	47,786	246,268	51,224	587,343	848,331	.....	56,000	792,331	178,519
Carolina, Clinch. & Ohio Ry. Co. of S. C.	18	79,171	12,087	92,887	5,042	642	7,277	17,790	2,850	33,601	59,286	.....	3,500	55,786	16,866
Central New England	277	1,911,262	211,380	2,225,952	310,236	189,116	8,520	617,684	23,969	1,149,525	1,076,427	—304	70,000	1,006,123	109,034
Central of Georgia	1,915	5,325,280	2,408,651	8,472,583	1,211,254	1,480,932	248,106	2,843,195	273,580	6,057,067	2,415,516	44,387	352,121	2,107,782	—129,174
Central of New Jersey	669*b*	12,878,207	3,397,714	17,175,998	1,478,493	2,418,624	215,936	5,038,957	297,073	9,449,083	7,726,915	40,325	869,188	6,898,052	781,096
Central Vermont	411	1,598,967	711,270	2,503,732	299,957	441,234	58,428	1,226,261	63,588	2,089,468	414,264	1,735	88,544	327,455	—106,777
Charleston & Western Carolina	341	813,243	227,756	1,097,436	199,998	174,896	23,406	417,149	32,083	847,532	249,904	.....	35,000	214,904	—55,627
Chesapeake & Ohio Lines	2,324*c*	16,417,471	3,579,660	20,943,909	2,473,250	4,418,635	392,291	6,466,792	460,420	14,211,388	6,732,521	28,088	740,085	6,020,524	—170,615
Chicago & Alton	1,026	6,176,395	2,596,553	9,443,855	1,413,338	2,154,361	298,066	3,358,508	226,490	7,450,763	1,993,092	—16,534	268,700	1,707,858	—261,929
Chicago & Eastern Illinois	1,275	7,150,191	1,855,197	9,768,282	1,241,840	1,963,779	175,712	3,598,876	297,269	7,277,476	2,490,806	—19,178	306,045	2,165,583	—295,886
Chicago & Erie	270	2,564,732	455,671	3,322,562	579,604	697,579	146,730	1,657,904	76,490	3,158,307	164,255	—8,521	92,019	63,715	—197,604

Average mileage operated during previous period—[25] 7,089; [26] 3,537; [27] 457; *ff* 3,314; *gg* 1,116; *hh* 3,054; *ii* 6,195; *jj* 551; *kk* 35; *ll* 475; [1] 7,731; [2] 662; [3] 4,526; [4] 628; [5] 572; *a* 4,434; *b* 672; *c* 2,281.

— Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1913—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Chicago & Northwestern	7,976[6]	$32,962,457	$12,745,174	$50,272,818	$6,399,259	$6,918,548	$800,552	$18,991,858	$900,778	$34,010,995	$16,261,823	$10,202	$2,121,000	$14,151,025	$3,350,557
Chicago, Burlington & Quincy	9,129[7]	39,457,299	13,799,966	58,336,846	5,918,119	9,397,640	928,389	17,742,036	1,500,910	35,487,094	22,849,752	—82,639	1,936,780	20,830,333	4,085,049
Chicago Great Western	1,496	5,799,151	1,958,388	8,384,837	969,810	1,166,217	325,361	3,252,104	240,685	5,954,177	2,430,660	—812	245,671	2,184,177	505,564
Chicago, Indiana & Southern	359	2,342,205	184,836	2,607,138	334,953	649,998	57,077	854,704	63,054	1,959,786	647,352	2,969	118,988	531,333	296,163
Chicago, Indianapolis & Louisville	617	2,770,649	1,025,183	4,172,273	583,261	548,764	128,031	1,542,693	107,012	2,909,761	1,262,512	.....	162,107	1,100,405	80,841
Chicago Junction	12	.....	.....	1,168,580	128,358	82,321	8,268	547,477	25,464	791,888	376,692	.....	11,260	365,432	59,626
Chicago, Milwaukee & Puget Sound†	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago, Milwaukee & St. Paul	9,592[d]	41,674,145	11,543,345	57,785,909	6,286,371	7,803,964	1,134,762	20,578,037	706,067	36,509,201	21,276,708	141,794	2,193,336	19,225,166	7,802,630
Chicago, Peoria & St. Louis‡	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago, Rock Island & Gulf	477	1,508,511	430,611	2,062,672	234,841	168,017	71,740	703,520	56,467	1,234,585	828,087	—4,314	49,071	774,702	126,886
Chicago, Rock Island & Pacific	7,566[8]	27,163,722	11,927,733	41,557,011	6,170,174	5,847,073	1,098,662	16,233,707	967,500	30,317,116	11,239,885	—109,976	1,672,083	9,457,826	1,342,134
Chicago, St. Paul, Minneapolis & Omaha	1,744	6,681,509	3,118,528	10,491,993	1,374,765	1,309,053	200,595	4,030,248	223,977	7,138,638	3,353,355	883	492,256	2,861,982	426,595
Chicago, Terre Haute & Southeastern	351	1,042,021	128,516	1,200,063	193,047	225,632	21,919	376,911	54,531	872,040	328,023	—1,177	70,000	256,846	—54,322
Cincinnati, Hamilton & Dayton	1,015	4,664,643	1,024,234	6,339,218	722,192	1,076,611	140,677	2,596,925	138,009	4,675,414	1,663,804	.....	250,813	1,412,991	—10,598
Cincinnati, New Orleans & Texas Pacific	337	4,673,963	1,135,613	6,112,301	595,020	1,387,641	161,395	1,711,272	134,351	3,989,679	2,122,622	—4,709	200,600	1,917,313	81,513
Cincinnati Northern	245	718,968	136,468	898,749	130,587	164,887	18,090	356,176	23,075	692,815	205,934	.....	38,362	167,572	67,202
Cleveland, Cincinnati, Chic. & St. Louis	2,014[e]	14,120,955	4,931,377	20,747,424	2,360,870	3,734,234	494,533	7,840,012	406,854	14,836,503	5,910,921	—6,812	724,043	5,180,066	584,760
Colorado & Southern	1,069[9]	4,088,175	892,320	5,319,976	706,307	1,155,408	74,371	1,557,868	152,998	3,646,952	1,673,024	—5,175	205,383	1,462,464	—48,746
Colorado Midland	338	963,491	178,122	1,252,621	153,854	240,029	50,218	534,926	39,157	1,018,184	234,437	922	61,600	173,759	—15,228
Cumberland Valley	162	1,512,463	432,364	2,037,258	367,615	240,522	31,416	659,727	57,740	1,357,020	680,238	524	42,728	638,034	114,484
Delaware & Hudson Co.—R. R. Dept	854[f]	11,914,820	1,990,571	14,388,241	1,148,944	2,024,095	168,936	4,786,465	389,359	8,517,799	5,870,442	—60,278	355,567	5,454,597	355,076
Delaware, Lackawanna & Western	958	18,040,947	4,931,897	29,589,166	2,844,667	3,607,453	465,838	7,382,785	461,707	14,762,450	9,826,716	384,002	923,340	9,287,378	1,649,574
Denver & Rio Grande	2,550[g]	11,374,663	3,306,601	15,359,933	1,962,055	2,683,219	332,653	4,929,518	406,199	10,313,644	5,046,289	10,735	562,900	4,494,124	925,985
Denver, Northwestern & Pacific	215	511,312	201,691	745,426	113,060	116,823	13,558	239,762	31,666	514,869	230,557	.....	24,250	206,057	—35,247
Detroit & Mackinac	411[h]	447,563	215,544	714,951	110,461	97,294	15,729	257,477	20,823	501,784	213,167	1,340	61,581	152,926	32,899
Detroit & Toledo Shore Line	79	776,114	.....	779,137	97,217	43,271	8,326	215,317	16,433	380,564	398,573	.....	33,150	365,418	39,660
Detroit, Grand Haven & Milwaukee	191	919,997	417,284	1,544,263	413,326	183,377	49,956	754,775	34,988	1,436,422	107,841	—450	20,671	86,720	—168,530
Detroit River Tunnel	2	.....	.....	712,720	15,288	19,451	.....	59,476	271	94,486	618,234	.....	31,508	586,726	—105,618
Detroit, Toledo & Ironton	441	873,065	100,941	1,049,925	219,112	117,552	19,002	499,352	37,374	892,392	157,533	—11	42,000	115,522	—1,699
Duluth & Iron Range	272[10]	4,430,270	150,485	4,647,008	525,453	415,792	6,766	979,431	92,260	2,019,702	2,627,306	21,633	224,367	2,424,572	—15,100
Duluth, Missabe & Northern	356[11]	5,085,832	265,986	5,406,247	546,048	567,703	14,561	1,023,101	95,161	2,246,574	3,159,673	18,141	257,589	2,920,225	486,307
Duluth, South Shore & Atlantic	627[i]	1,278,530	604,287	1,979,964	417,776	226,408	70,679	764,162	77,334	1,556,359	423,605	6,074	125,914	303,765	—102,593
Elgin, Joliet & Eastern	819[j]	7,150,554	48	7,739,183	807,727	1,141,832	33,764	2,100,552	128,112	4,211,987	3,527,196	.....	157,333	3,369,863	1,210,774
El Paso & Southwestern Co	968[12]	4,136,856	623,526	4,987,998	549,812	655,882	93,979	1,335,606	182,258	2,817,537	2,170,461	—14,205	203,952	1,952,304	436,741
Erie	1,988[k]	24,050,075	5,762,780	32,337,386	3,735,549	5,595,842	669,749	10,569,538	601,197	21,171,875	11,165,511	—180,678	1,026,980	9,957,853	1,086,173
Florida East Coast	642[l]	1,261,076	850,500	2,419,685	460,599	381,338	54,762	923,456	84,601	1,904,756	514,929	—8,925	108,500	397,504	136,961
Fort Worth & Denver City	454	2,204,550	1,005,101	3,366,332	316,004	556,581	48,950	1,073,159	104,790	2,099,484	1,266,848	—3,701	79,287	1,183,860	46,172
Galveston, Harrisburg & San Antonio	1,338	5,118,192	1,877,782	7,369,600	678,281	1,535,430	231,865	2,806,801	219,079	5,471,456	1,898,144	—41,276	228,255	1,628,613	276,732
Georgia	307	1,159,648	541,113	1,830,000	229,400	361,918	81,861	917,741	57,651	1,648,571	181,429	.....	20,930	160,499	—429,584
Grand Rapids & Indiana	577[13]	1,929,987	1,173,173	3,370,395	417,458	494,403	82,011	1,370,017	109,702	2,473,591	896,804	179	166,860	730,123	98,425
Grand Trunk Western	347	2,703,840	1,403,009	4,381,097	510,066	602,190	151,899	1,785,912	113,248	3,163,315	1,217,782	—10,119	209,140	998,523	41,472
Great Northern	7,774[m]	36,451,990	9,192,049	48,701,209	6,187,902	5,495,867	690,135	12,649,747	747,885	25,771,536	22,929,673	127,325	2,237,948	20,819,050	3,121,788
Gulf & Ship Island	308	870,083	252,498	1,204,935	168,056	217,786	18,963	320,181	58,392	783,378	421,557	.....	43,228	378,329	18,798
Gulf, Colorado & Santa Fe	1,596[n]	6,324,382	1,910,979	8,702,741	1,356,532	1,200,269	170,471	3,018,675	241,598	5,987,545	2,715,196	.....	281,868	2,433,328	661,608
Hocking Valley	352[o]	3,828,798	578,890	4,709,779	474,125	944,540	62,366	1,362,479	98,752	2,942,262	1,767,517	.....	275,100	1,492,417	58,353
Houston, East & West Texas	191	555,921	217,211	819,312	175,960	112,996	14,763	261,688	26,318	591,725	227,587	.....	24,574	203,013	—23,960
Houston & Texas Central	789	2,806,807	1,176,614	4,250,170	558,063	723,426	125,239	1,628,201	119,518	3,154,447	1,105,723	—9,914	133,479	962,330	215,734
Illinois Central	4,763	25,329,626	8,302,276	38,513,777	5,260,683	8,234,010	801,939	14,742,998	882,338	29,922,018	8,591,759	—63,321	1,664,250	6,864,188	2,617,868
Indiana Harbor Belt	105	.....	.....	1,865,864	206,494	228,141	18,982	787,700	44,119	1,285,436	580,428	16,881	39,054	558,255	179,956
Kanawha & Michigan	177[14]	1,694,649	230,342	1,967,473	264,540	345,155	16,390	553,697	44,686	1,224,468	743,005	—134	62,951	679,920	24,675
Kansas City Southern	827	4,754,288	1,028,128	6,404,485	618,544	794,601	181,146	2,064,946	225,971	3,885,208	2,519,277	.....	259,630	2,259,647	671,159
Lake Erie & Western	906[15]	2,907,975	557,406	3,664,850	515,852	635,282	85,137	1,360,164	79,835	2,676,270	988,580	.....	143,131	845,449	151,511
Lake Shore & Michigan Southern	1,872[16]	22,858,876	7,561,914	34,116,789	4,048,511	5,692,093	580,341	10,635,691	561,012	21,517,648	12,599,141	108,488	1,081,098	11,626,531	1,336,497
Lehigh & Hudson River	97	1,010,657	30,293	1,075,824	142,572	156,209	9,242	376,837	30,932	715,792	360,032	.....	28,000	332,032	32,344
Lehigh Valley	1,452[17]	22,090,852	2,977,243	25,939,293	3,602,108	4,232,451	564,543	8,161,610	487,135	17,047,847	8,891,446	—88,785	823,500	7,979,161	1,303,939
Long Island	399	2,089,640	4,565,684	6,996,112	903,672	754,824	105,265	2,927,677	163,391	4,854,829	2,141,283	409,015	407,500	2,142,798	287,443
Louisiana & Arkansas	255	776,816	147,686	960,536	152,839	147,957	17,085	263,282	34,530	615,693	344,843	.....	28,402	316,441	80,117
Louisiana Ry. & Navigation	351	896,964	180,485	1,150,098	153,891	132,485	41,365	451,556	44,088	823,385	326,713	.....	37,500	289,213	—27,148
Louisiana Western	208	866,104	407,436	1,331,245	160,443	226,378	49,178	398,554	39,693	874,246	456,999	701	53,916	403,784	141,040
Louisville & Nashville	4,919[18]	25,251,222	7,710,699	35,143,893	5,764,884	6,631,062	735,340	11,320,045	791,439	25,242,770	9,901,123	—13,409	1,080,191	8,807,523	—531,004
Louisville, Henderson & St. Louis	200	452,025	230,971	731,471	199,888	95,992	30,995	271,212	22,088	620,175	111,296	1,715	21,000	92,011	—82,621
Maine Central	1,206[p]	4,095,470	2,222,089	6,729,070	1,103,312	902,477	73,914	2,456,906	175,195	4,711,804	2,017,266	—19,366	304,081	1,693,819	154,334
Michigan Central	1,817	13,203,944	5,309,259	20,575,746	2,429,498	2,940,641	469,199	7,997,379	358,971	14,195,688	6,380,058	29,433	786,985	5,622,506	110,676
Midland Valley	373	598,742	293,395	939,615	229,811	147,864	18,251	301,734	39,172	736,832	202,783	1,994	41,777	163,000	—18,139
Minneapolis, St. Paul & Sault Ste. Marie	3,976[q]	14,098,835	4,225,554	19,319,970	1,948,288	2,227,663	380,751	5,755,843	379,812	10,692,357	8,627,613	119,419	1,011,835	7,735,197	2,145,998
Missouri, Kansas & Texas System	3,817[r]	13,393,706	5,748,792	20,281,335	2,675,554	2,406,940	432,304	7,163,071	600,583	13,278,452	7,003,383	—47,385	765,451	6,200,547	2,053,314
Missouri Pacific	3,920[s]	12,816,278	3,167,919	17,363,701	2,737,363	3,036,070	421,805	7,082,398	475,076	13,752,712	3,610,989	—20,708	663,330	2,926,951	1,975,578
Mobile & Ohio	1,114	5,865,753	904,501	7,189,168	824,760	1,359,196	262,407	2,540,131	219,067	5,205,561	1,983,607	—9,837	209,844	1,763,926	39,172
Monongahela	65	941,695	17,357	970,986	114,985	63,730	2,469	184,494	14,139	379,817	591,169	.....	16,243	574,926	202,840

† Merged with Chicago, Milwaukee & St. Paul Ry. Company, January 1, 1913. ‡This road taken out of the hands of the Receivers on January 1, 1913. No cumulative figures shown.

Average mileage operated during previous period—[6] 7,918; [7] 9,074; [8] 7,551; [9] 1,053; [10] 274; [11] 342; [12] 902; [13] 586; [14] 176; [15] 886; [16] 1,775; [17] 1,450; [18] 4,705; *d* 9,570; *e* 2,012; *f* 852; *g* 2,545; *h* 358; *i* 624; *j* 841; *k* 1,995; *l* 614; *m* 7,274; *n* 1,597; *o* 353; *p* 1,204; *q* 3,770; *r* 3,399; *s* 3,915. —Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1913—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Morgan's La. & Tex. R. R. & S. S. Co..	404	$2,005,922	$671,757	$2,829,392	$488,686	$446,935	$89,665	$1,149,547	$75,906	$2,250,739	$578,653	—$13,298	$130,789	$434,566	—$330,126
Nashville, Chattanooga & St. Louis.....	1,231[t]	5,349,148	1,887,233	7,769,687	1,195,145	1,374,696	276,737	2,945,006	204,821	5,996,405	1,773,282	—4,536	177,912	1,590,834	110,008
Nevada Northern	165	789,880	110,875	926,774	105,994	105,952	2,901	199,187	24,360	438,394	488,380	.....	43,005	445,375	56,157
New Orleans & North Eastern.....	196	1,600,948	384,852	2,143,662	228,327	414,477	69,251	836,512	86,438	635,005	508,657	—129	88,681	419,847	—128,662
New Orleans Great Northern.....	283	697,172	214,063	989,191	155,156	107,081	16,997	296,680	46,281	622,195	366,996	—460	14,861	351,675	57,298
New Orleans, Texas & Mexico.....	276	751,217	127,322	950,296	169,412	81,600	23,493	406,349	43,406	724,260	226,036	.....	17,108	208,928	82,610
New York Central & Hudson River.....	3,597	40,136,427	20,544,458	67,693,330	9,081,905	12,254,647	1,299,879	23,935,859	1,604,479	48,176,769	19,516,561	324,782	3,545,244	16,296,099	1,168,964
New York, Chicago & St. Louis.....	564[19]	6,359,108	993,322	7,616,642	745,061	933,887	362,558	3,104,104	118,384	5,263,994	2,352,648	—11,320	233,583	2,107,745	260,757
New York, New Haven & Hartford....	2,091	20,565,747	16,874,250	41,323,675	4,616,692	5,236,427	221,508	15,757,952	1,117,293	26,949,872	14,373,803	764,143	2,275,000	12,862,746	634,435
New York, Ontario & Western.....	566	4,329,331	1,143,887	5,755,486	720,813	873,086	78,066	2,063,865	117,161	3,852,991	1,902,495	—427	127,167	1,774,901	403,764
New York, Philadelphia & Norfolk.....	112	1,664,899	311,346	2,143,777	172,443	376,649	28,365	916,775	88,828	1,583,060	560,717	.....	55,400	505,317	40,526
New York, Susquehanna & Western....	154[u]	1,151,858	345,589	1,692,644	207,200	210,396	13,193	721,470	32,614	1,184,873	507,771	—5,263	111,636	3,908,872	—206,360
Norfolk & Western	2,019[v]	22,229,047	2,912,631	25,962,508	3,284,587	4,700,082	392,005	7,479,119	472,067	16,327,860	9,634,648	—19,438	842,000	8,773,210	1,303,444
Norfolk Southern	562	1,238,602	500,023	1,905,712	234,615	258,466	33,961	593,141	105,204	1,225,387	680,325	—8,754	52,569	619,002	41,525
Northern Central	472[20]	5,900,131	1,468,501	7,882,571	902,875	1,490,823	111,505	3,701,091	185,118	6,391,412	1,491,159	4,925	289,827	1,206,257	319,884
Northern Pacific	6,240[21]	32,592,630	9,703,219	44,956,055	5,694,812	4,979,670	714,601	13,951,609	616,763	25,957,455	18,998,600	269,014	2,221,554	17,046,060	2,682,852
Northwestern Pacific	401[w]	901,807	1,205,888	2,266,748	317,037	267,592	25,318	801,650	91,387	1,502,984	763,764	.....	88,053	675,711	57,222
Oregon Short Line	1,914[x]	9,925,992	3,030,784	13,759,726	1,377,393	1,452,610	207,307	3,370,085	285,989	6,693,384	7,066,342	9,008	930,177	6,145,173	582,130
Oregon-Washington R. R. & Nav. Co...	1,919[y]	7,274,499	3,133,083	11,110,554	1,420,192	1,192,434	326,414	3,922,605	333,597	7,195,242	3,915,312	—25,996	670,091	3,219,225	396,161
Pecos & Northern Texas.....	479	1,151,842	310,192	1,563,889	186,066	289,203	25,558	472,408	43,920	1,017,155	546,734	.....	32,585	514,149	248,216
Pennsylvania Co.	1,751[z]	30,725,508	5,997,908	40,493,050	6,198,759	7,125,715	582,113	13,539,335	699,014	28,144,936	12,348,114	—23,106	1,710,295	10,614,713	2,108,095
Pennsylvania R. R.....	4,025[22]	78,047,255	22,040,419	107,269,172	13,648,412	22,515,723	1,361,923	37,760,466	2,436,834	77,723,358	29,545,814	—579,860	4,372,356	24,593,598	2,668,846
Peoria & Eastern.....	352	1,629,121	449,484	2,214,525	261,888	393,613	31,690	806,949	40,245	1,534,385	680,140	.....	79,148	600,992	150,580
Pere Marquette	2,330[23]	7,176,677	2,608,398	10,665,041	1,590,079	1,782,469	238,463	4,332,412	252,625	8,196,048	2,468,993	7,423	391,811	2,084,605	115,831
Philadelphia & Reading.....	1,015	24,544,966	4,261,583	30,273,943	2,734,811	4,803,669	293,899	9,408,527	429,554	17,670,460	12,603,483	243,516	603,861	12,243,138	2,673,261
Philadelphia, Baltimore & Washington..	713	6,186,649	4,969,105	12,412,886	2,023,255	2,153,796	196,306	5,058,506	307,263	9,739,126	2,673,760	.....	386,689	2,287,071	—135,269
Pittsburgh & Lake Erie.....	223[aa]	10,238,288	1,035,706	11,693,937	1,105,232	1,660,976	101,577	2,536,898	177,380	5,582,063	6,111,874	—1,886	222,989	5,886,999	1,554,684
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472[bb]	19,285,650	5,077,412	27,180,074	4,083,427	5,103,670	497,831	9,538,039	497,136	19,720,103	7,459,971	—4,917	988,709	6,466,345	596,527
Pittsburgh, Shawmut & Northern.....	279[24]	1,030,441	68,342	1,117,328	161,184	241,759	8,355	349,237	26,890	787,425	329,903	.....	11,125	318,778	44,721
Port Reading	21	942,365	.....	960,777	69,654	2,478	213	248,247	1,132	321,724	639,053	47,370	56,000	630,423	189,501
Richmond, Fredericksburg & Potomac...	88[cc]	852,409	549,991	1,609,037	175,798	193,382	20,806	584,550	47,459	1,021,995	587,042	—1,043	5,188	580,811	113,940
Rutland	468	1,207,710	768,178	2,264,494	272,274	436,609	59,077	881,291	45,821	1,695,072	569,422	.....	94,766	474,656	—20,132
St. Joseph & Grand Island.....	319	645,795	247,895	979,380	200,823	135,379	34,178	420,283	39,006	829,669	149,711	—1,313	42,797	105,601	—2,913
St. Louis & San Francisco.....	4,742[dd]	17,737,784	6,796,590	26,293,958	3,336,909	3,339,900	546,746	9,156,716	710,650	17,090,921	9,203,037	.....	1,189,883	8,013,154	896,858
St. Louis, Brownsville & Mexico.....	518[ee]	1,025,531	533,725	1,664,461	266,580	179,733	33,490	772,027	64,320	1,316,150	348,311	.....	40,947	307,364	—82,579
St. Louis, Iron Mountain & Southern...	3,318[ff]	15,230,125	3,959,843	20,609,643	3,608,767	3,027,742	377,585	6,386,642	481,137	13,881,873	6,727,770	—32,971	631,365	6,063,434	1,130,640
St. Louis Merchants' Bridge Terminal...	9	.....	2,563	1,270,794	201,831	57,855	4,738	625,684	43,956	934,064	336,730	.....	41,250	295,480	159,944
St. Louis, San Francisco & Texas.....	244	678,029	227,308	958,343	162,598	113,613	17,675	371,270	38,128	703,284	255,059	.....	7,213	247,846	102,994
St. Louis Southwestern of Texas.....	703	2,139,773	731,022	3,057,129	554,889	565,175	94,423	1,158,883	138,763	2,512,133	544,996	—1,444	74,934	468,618	—58,289
San Antonio & Aransas Pass.....	727	2,284,961	878,047	3,313,301	464,630	384,627	43,017	1,163,290	73,522	2,129,086	1,184,215	.....	84,000	1,100,215	198,931
San Pedro, Los Angeles & Salt Lake....	1,135[gg]	3,760,028	1,834,734	6,020,594	668,718	994,040	213,541	1,918,098	134,134	3,928,531	2,092,063	—12,266	229,333	1,850,464	1,336,335
Seaboard	3,070[hh]	9,392,483	3,028,704	13,819,781	1,924,439	1,898,716	441,925	5,007,482	402,022	9,674,584	4,145,197	—18,219	567,000	3,559,978	383,022
Southern	7,036[25]	26,500,837	11,161,514	40,797,858	5,332,450	6,701,096	1,174,838	13,577,038	1,169,628	27,955,050	12,842,808	44,016	1,451,276	11,435,548	630,075
Southern in Mississippi.....	281	442,062	237,351	734,619	191,373	63,883	16,972	300,473	29,151	601,852	132,767	.....	48,750	840,017	—65,688
Southern Kansas Ry. of Texas.....	125	761,448	133,930	929,270	68,135	181,444	15,578	271,792	25,420	562,369	366,901	.....	14,530	352,371	229,061
Southern Pacific Co.....	6,323[ii]	34,931,920	19,109,925	57,940,718	6,110,068	7,779,716	1,179,283	15,800,886	1,493,484	32,363,437	25,577,281	1,055,943	2,621,639	24,011,585	2,564,299
Spokane, Portland & Seattle.....	556[jj]	1,993,046	1,029,711	3,297,418	351,188	271,241	53,989	770,911	88,804	1,536,133	1,761,285	3,130	373,800	1,390,615	140,692
Tennessee Central	294	667,540	262,971	984,048	209,515	101,867	41,571	338,683	49,734	741,370	242,678	.....	29,853	212,825	49,640
Terminal R. R. Ass'n of St. Louis.....	34[kk]	.....	1,987	1,804,702	273,794	114,758	6,445	657,892	48,095	1,100,984	703,718	77,724	192,085	589,357	174,944
Texas & New Orleans.....	458	1,605,116	687,890	2,449,644	434,509	568,656	55,834	960,120	84,933	2,104,052	345,592	816	89,220	257,188	12,640
Texas & Pacific	1,885	7,840,446	2,836,945	11,395,376	1,409,433	1,745,391	236,401	5,036,470	327,733	8,755,428	2,639,948	—20,844	391,391	2,227,713	—674,294
Toledo & Ohio Central.....	443	2,779,548	400,154	3,367,671	470,715	620,984	48,219	1,144,958	63,902	2,348,778	1,018,893	—5,364	149,397	864,132	4,026
Toledo, Peoria & Western.....	248	499,237	301,369	847,470	146,205	170,330	17,293	303,251	24,430	661,509	185,961	.....	34,700	151,261	31,543
Toledo, St. Louis & Western.....	451	2,126,287	226,710	2,503,224	332,217	332,087	83,840	859,359	64,437	1,671,940	831,284	.....	103,600	727,684	161,864
Trinity & Brazos Valley.....	463	1,512,886	350,226	1,935,108	292,546	227,813	70,781	844,047	85,680	1,520,867	414,241	.....	29,013	385,228	131,405
Union Pacific	3,575[26]	23,006,021	6,582,917	32,331,544	3,336,600	3,674,066	613,964	8,409,375	768,067	16,802,072	15,529,472	—14,245	1,286,048	14,229,179	1,984,174
Union R. R. of Baltimore.....	9	853,010	160,939	1,025,545	68,411	.....	5,766	37,181	18,861	130,219	895,326	.....	39,368	855,958	136,877
Union R. R. of Pennsylvania.....	31	.....	.....	2,818,026	199,636	599,058	804	1,004,114	29,199	1,832,811	985,215	18,726	42,750	961,191	133,103
Vandalia	827	4,730,468	1,465,457	6,879,104	864,143	1,306,165	177,726	2,474,344	129,866	4,952,244	1,926,860	.....	217,586	1,709,274	508,818
Vicksburg, Shreveport & Pacific.....	171	604,669	327,036	1,014,828	206,847	172,754	23,243	308,086	35,832	746,762	268,066	—3,297	40,735	224,034	37,471
Virginia & Southwestern.....	240	908,680	107,039	1,044,266	161,111	242,243	13,366	288,815	24,290	729,825	314,441	.....	37,100	277,341	—43,184
Virginian	503[ll]	3,005,698	185,963	3,279,505	426,194	617,669	37,376	781,998	61,608	1,924,845	1,354,660	41,597	123,100	1,273,157	241,859
Wabash	2,515	13,185,726	4,529,691	19,304,964	2,470,222	3,244,471	604,761	7,712,978	456,729	14,489,161	4,815,803	—27,810	508,380	4,279,613	402,846
Washington Southern	36	267,284	267,957	726,341	94,424	86,224	8,533	283,042	19,822	492,045	234,296	—1,678	24,064	208,554	15,521
West Jersey & Seashore.....	356	1,129,900	2,675,390	4,064,123	559,254	602,201	106,936	1,586,084	90,806	2,945,281	1,118,842	—26,680	148,179	943,983	291,032
Western Maryland	543	3,593,314	615,803	4,441,437	687,866	626,987	109,755	1,858,175	93,994	3,376,777	1,064,660	.....	140,000	924,660	—430,968
Western Pacific	937	2,813,471	798,140	3,723,341	553,231	311,627	204,106	1,411,721	177,047	2,657,732	1,065,609	—5,027	147,444	913,138	335,507
Western Ry. of Alabama.....	133	434,080	339,103	841,751	138,298	151,044	40,906	230,329	39,744	600,321	241,430	131	33,571	207,990	—2,879
Wheeling & Lake Erie.....	459[27]	4,266,005	410,770	4,943,063	635,090	909,662	57,351	1,536,473	112,480	3,251,056	1,692,007	20,346	213,908	1,498,445	77,224
Yazoo & Mississippi Valley.....	1,374	4,498,459	1,673,163	6,625,668	1,200,884	934,253	107,461	2,561,269	187,421	4,991,288	1,634,380	564	259,000	1,375,944	244,268

Average mileage operated during previous period—[19] 562; [20] 473; [21] 6,034; [22] 4,018; [23] 2,333; [24] 278; [25] 7,089; [26] 3,537; [27] 457; *t* 1,230; *u* 152; *v* 2,014; *w* 404; *x* 1,762; *y* 1,920; *z* 1,760; *aa* 215; *bb* 1,467; *cc* 83; *dd* 4,732; *ee* 510; *ff* 3,314; *gg* 1,116; *hh* 3,054; *ii* 6,195; *jj* 551; *kk* 35; *ll* 475. — Indicates Deficits, Losses and Decreases.

Secretary McGinty.

The new secretary of the Interstate Commerce Commission, succeeding John H. Marble, who has been promoted to the position of commissioner, is George Banks McGinty. He has been assistant secretary during the past year. Mr. McGinty has had several years' experience in railroad work, having served in clerical departments of the Atlantic Coast Line, the Georgia Railroad and the Southern Railway.

He was born September 8, 1878, in Monroe county, Ga., and was educated at Emory College, Oxford, Ga. After leaving college he commenced the study and practice of law, but he left that to go into the railroad service. On the Atlantic Coast line he was in the soliciting agent's office, at Atlanta. On the Georgia Railroad, he was in a local freight office, and he began on the Southern Railway in the maintenance of way department. During the last two years of his service on this road, he was private secretary to the vice-president and general manager.

George B. McGinty.

In 1906, when the meat inspection bill was passed, he entered the government service, his first position being in the Bureau of Animal Industry, Department of Agriculture. Here he handled correspondence with carriers respecting conformance by meat shippers and carriers with regulations promulgated by the department governing the transportation of meat and meat products. In November, 1908, he entered the service of the Interstate Commerce Commission, in the division of statistics and accounts. Subsequently he served as confidential clerk to Commissioner Clements. When Secretary Moseley died the duties of the secretary's office to a great extent fell to the office of the chairman, which brought much of this work into Mr. McGinty's hands. He was appointed by the commission as special examiner in October, 1911, but was retained in the chairman's office throughout the chairmanship of Commissioner Clements, and likewise served in a similar capacity to Chairman Prouty. When Mr. Marble was appointed secretary on February 10, 1912, Mr. McGinty was made assistant secretary, as before indicated.

Weighing Investigation.

The weighing investigation on which the Interstate Commerce Commission has been at work for over a year, will be assigned for argument at Washington on April 16, at which time all interested parties will be heard upon any subject covered by the investigation. The following matters are particularly suggested by the commission for discussion:

1. Should the federal government assume jurisdiction over the installation and operation of railroad track scales, and if so, to what extent?
2. In what manner should track scales be inspected and tested, and within what limit should variations in weight be permitted before the scale is announced inaccurate?
3. Should cars be weighed in motion? Should they be weighed coupled at either end or at both ends?
4. The tare weight of cars. In what manner should the stenciled weight be ascertained and corrected? In correcting tare weights what tolerance should be allowed?
5. When should the loaded car be first weighed, and to whom should notice of the weight be given?

Under what circumstances should the original weight be changed, and to whom and how should such notice be given?

What tolerance should be permitted before correcting the original weight, and should this be the same as applied to all commodities?

To what extent may platform scale weights or estimated weights be used in correcting track scale weights?

Is there any distinction between those instances where the weight is first ascertained upon the track scales of the carrier and those where that weight is furnished by the shipper under a weighing agreement or otherwise?

The commission will not at this time undertake to formulate rules in detail as to the weighing of carload freight, but will hold that subject over pending present negotiations between carriers and shippers looking to an agreement upon such rules.

Reparation Awarded.

Lindsay Brothers v. Chicago, & North Western. Opinion by the commisison:

In this case the complainant contends that the defendant's rates of 19.5 cents per 100 lbs. in less than carloads and 11.4 cents per 100 lbs. in carloads for the transportation of tank heaters, litter carriers and shoveling boards from Harvard, Ill., to Milwaukee, Wis., are unreasonable to the extent that they exceed 12 cents and 6 cents per 100 lbs. respectively. Reparation was asked. The commission found that the rates now in effect on this traffic are unreasonable to the extent that they exceed 15 cents per 100 lbs. on less than carload shipments and 8 cents per 100 lbs. on carload shipments and prescribed those rates for the future. (26 I. C. C., 329.)

Transit Privilege Denied.

Michigan Cereal Company v. Pere Marquette et al. Opinion by the commission:

The complainant contends that the withdrawal by the defendants of the privilege of splitting peas in transit at Port Huron and Ubly when destined to the Pacific coast is discriminatory and seeks the re-establishment of this transit privilege. It was argued that as grain, including corn, barley, wheat, etc., moving to the Pacific coast was accorded milling-in-transit privileges, those privileges should also be extended to split peas, as that commodity was in fact a grain and was shown as such in certain other tariffs. The commission found that there was not sufficient similarity or competition between peas and grain to warrant an order extending the transit privilege to peas. The defendants stated that they had not been aware of a transit privilege on peas until immediately prior to the date on which that privilege was withdrawn. The commission found that the transit privileges were not extended to split peas in transcontinental territory and decided that there was not sufficient ground for granting the relief sought. The complaint was dismissed. (26 I. C. C., 320.)

Rates on Smokeless Powder Reduced.

United States v. Wharton & Northern et al. Opinion by the commission:

The complainant contends that smokeless powder and nitrocellulose-wet are safe to handle and transport, and that as classified in official classification territory smokeless powder is unjustly and unreasonably assessed double first-class rates for lots under 10,000 lbs., and first-class rates for lots of 10,000 lbs., or over, and nitro-cellulose-wet is unjustly assessed first-class rates, any quantity. The commission found that smokeless powder was not as dangerous as some other explosives, and that it had in a large measure displaced some of the more dangerous varieties and thereby contributed to the increased safety of railroad traffic. The commission decided that smokeless powder should not be classified higher than one and one half times the first-class rates in less than carload lots and second-class rates in carloads with a minimum of 20,000 lbs., per car. As the use of nitro-cellulose-wet is rapidly diminishing, and as it was susceptible to detonation by the explosion of another high explosive nearby, no change was made in the classification of that commodity. (25 I. C. C., 309.)

Equipment of Insufficient Capacity.

Atlas Lumber & Shingle Company v. Northern Pacific et al. Opinion by the commission:

The complainant ordered a 30-ton box car, but the initial carrier was unable to furnish a box car and offered instead a flat car which the complainant was obliged to accept. When loaded

to its full carrying capacity with fir lath the car furnished contained only 44,500 lbs., though the car minimum was 60,000 lbs. A car of the character ordered would have been loaded to or beyond its full minimum weight by this commodity. The complainant was charged 50 cents per 100 lbs., based on a car minimum of 60,000 lbs., for the transportation of this shipment from Tacoma, Wash., to Omaha, Neb. The complainant contends that it was unjust to charge for more than the actual weight of the shipment, and asked for reparation. The tariffs of the defendants provide that when a car of the size ordered by shipper cannot be furnished, and a larger car is furnished, the larger car may be used on the basis of the minimum weight of the car ordered, or on the basis of actual weight of the shipment if greater than such minimum. There was no rule to govern the use of a flat car furnished in lieu of a box car ordered. The defendants were willing to make reparation on the basis claimed, but were not willing to publish a rule to meet similar conditions that might arise in the future. The commission decided that reparation should be awarded, and also that the defendants should be required to amend their tariff to make reasonable and proper provision to meet such conditions in the future, as the fault for not furnishing the desirable equipment lay with the carrier. (26 I. C. C., 313.)

Complaint Dismissed.

Evens & Howard Fire Brick Company v. Wabash. Opinion by the commission:

The alleged excessive charges on a carload shipment of fire brick from St. Louis, Mo., to Detroit, Mich., was found to have been due to the complainant's error in making out the shipping ticket. (26 I. C. C., 152.)

Through Water and Rail Route Restored.

Augusta & Savannah Steamboat Company v. Ocean Steamship Company of Savannah et al. Opinion by Commissioner Prouty:

The complainant operates a line of steamboats between Augusta, Ga., and Savannah. The Ocean Steamship Company and the Merchants & Miners Transportation Company, two of the defendants, operate steamship lines between Savannah and New York, Philadelphia and other north Atlantic points. The remaining defendants are railroad companies leading from these various north Atlantic points to interior destinations. Prior to 1905 joint rates were in force on traffic moving from Augusta to Savannah via the line of the complainant, then to north Atlantic ports by the defendants' steamships and finally to the interior destinations by rail. A joint rate of this character is still in effect between Augusta and North Adams, Mass., upon cotton piece goods. The commission decided that as the defendants had voluntarily subjected themselves to the jurisdiction of the commission with respect to the traffic destined to North Adams, it had the power to compel the filing of similar tariffs with respect to other points similar to North Adams and in competition with it. At present the traffic moves from Augusta to Savannah by rail, thence to the northern Atlantic ports by the steamship lines of the defendant and finally to the interior destinations by rail. The commission found that the complainant had ample facilities for transferring its freight to the steamships of the defendants at Savannah, and ordered that through routes should be established between the same points over which they were in effect previous to their withdrawal by the defendant in 1905. With regard to the rates the commission found that they ought to be slightly less than the present rail-water-and-rail rates, but could not decide as to the precise amount. The case will therefore be held open until satisfactory rates shall have been established. (26 I. C. C., 380.)

Through Routes and Joint Rates Denied.

Blakely Southern v. Atlantic Coast Line et al. Opinion by Commissioner Meyer:

The Blakely Southern is a 22-mile line extending from Blakely, Ga., on the Central of Georgia, to Jakin, Ga., on the Atlantic Coast Line. The complainant asks that the defendants be required to establish through routes and joint rates on interstate traffic to Jakin over the Central of Georgia and the complainant's lines, and to Blakely over the Atlantic Coast Line and the complainant's lines, equal to rates now in effect over the Atlantic Coast Line to Jakin and over the Central of Georgia to Blakely. The Blakely Southern was built as a plant facility by the Flowers Lumber Company, at Jakin, and the Flowers Brothers Lumber Company, at Blakely. This line was subsequently taken over by the Blakely Southern Railroad Company. One of the clauses of the contract provides that if equal rates are offered, all the business of the lumber company is to be delivered to the Blakely Southern. The connecting carriers have voluntarily established joint rates both intrastate and interstate to and from all local points on the Blakely Southern, but have refused to establish joint rates to and from Jakin and Blakely. The Georgia Railroad Commission recently required the defendants to establish joint intrastate rates from Jakin via Blakely and from Blakely via Jakin. The commission found that if the complainant's petition were granted, all of the lumber now moving out by the Atlantic Coast Line would move under the same rate via the Blakely Southern and the Central of Georgia and the Atlantic Coast Line would be compelled, by a competition benefiting only the Blakely Southern, to reduce its reasonably low rate in order to retain traffic to which it was properly entitled. The commission found further that the shippers at Blakely and Jakin now enjoyed adequate transportation service. In nearly every instance class rates to points on the Blakely Southern are higher than the rates from the same points of origin to either Blakely or Jakin. This indicates that if competitive rates at Blakely and Jakin were established, the fourth section of the act would be violated by charging a higher rate for the shorter distance to one of the local stations than for the longer distance to one or another of the termini. The commission decided that the granting of the complainant's petition would not materially benefit the shippers and dismissed the complaint. (26 I. C. C., 344.)

STATE COMMISSIONS.

The Illinois railroad and warehouse commission has issued supplement No. 8 to its official express classification No. 21, effective April 1.

The Indiana railroad commission has entered an order reducing the freight rates in Indiana on crushed lime stone used for agricultural purposes.

The Texas railroad commission has announced a public hearing on April 8, on a plan of revising the demurrage rules. A number of detailed changes in the present rules have been proposed by shippers concerning the notice to be given consignees, and similar matters.

The chairmen of the Michigan railroad commission, the public service commission of Ohio, and the railroad commission of Indiana, will appear before the Interstate Commerce Commission at Washington on April 4 to present oral arguments in support of the petition filed by the three commissions asking for the addition of one or more classes to the Official Classification, and the arrangement of classes so that the rates applicable on commodities named in the lowest class shall not exceed 10 per cent. of the rates on commodities named in the first class.

The Missouri railroad and warehouse commission has served notice on the railways operating in Missouri that the approval of Western Classification No. 51 by the commission is denied, and that on all intrastate traffic Western Classification No. 50 remains in force and effect. This action follows shortly after the decision of the Interstate Commerce Commission allowing Western Classification No. 51 to go into effect with modifications suggested by the commission, after a year of investigation, during which the new classification was suspended.

COURT NEWS.

The Supreme Court of Indiana has rendered a decision affirming the action of the Marion county superior court, denying an injunction asked by the Vandalia to prevent the enforcement of the headlight law of 1909.

Judge Pollock, of the United States district court at Kansas City, Kan., has denied an injunction asked by five railway companies for the purpose of preventing the Kansas oil rate law of 1905 from going into effect. The injunction was denied on the ground that the law has been effectively repealed by the law creating the public utilities commission.

Railway Officers.

Executive, Financial and Legal Officers.

C. S. Snow has been appointed auditor of the St. Louis, San Francisco & Texas, and the Ft. Worth & Rio Grande, with headquarters at Ft. Worth, Tex., succeeding E. B. Pierce, resigned.

J. D. Nettleship, auditor of freight accounts of the St. Louis & San Francisco, has been appointed assistant general auditor, succeding W. P. Newton, promoted; R. S. Hoxie, first assistant auditor of freight accounts, succeeds Mr. Nettleship; F. C. Freiburg, second assistant auditor of freight accounts, takes the place of Mr. Hoxie, and C. Goehausen succeeds Mr. Freiburg; all with headquarters at St. Louis, Mo.

A. T. Hardin, assistant vice-president of the New York Central & Hudson River, at New York, has been appointed vice-president in charge of operation, maintenance and construction of the New York Central & Hudson River and the Ottawa & New York, with headquarters at Grand Central Terminal, New York. Abraham Tracy Hardin was born in 1868, in South Carolina, and graduated from the University of South Carolina with the degree of civil engineer in 1894. He had been a telegraph operator in 1882 on the Richmond & Danville, and from 1882 to 1890 he was agent and stenographer on the same road. He attended college from 1890 to 1894, and then for four years was in the maintenance of way department of the Southern Railway. From 1898 to September, 1899, he was supervisor and division engineer of the Eastern division of the New York Central & Hudson River, and was then to February, 1903, engineer of track, on the same road. He was promoted in February, 1903, to engineer of maintenance of way, and from July, 1905, to June, 1906, was assistant to the general manager, becoming assistant general manager in June, 1906, which position he held until April, 1912, when he was promoted to assistant vice-president. His appointment as vice-president takes effect April 1.

J. J. Bernet, assistant vice-president of the Lake Shore & Michigan Southern, Lake Erie & Western, Cleveland, Cincinnati, Chicago & St. Louis, Michigan Central, Peoria & Eastern, Cincinnati Northern, Toledo & Ohio Central, Zanesville & Western, Chicago, Indiana & Southern and the Indiana Harbor Belt, has been appointed vice-president of those roads, in charge of operation, maintenance and construction, with headquarters at Chicago, effective April 1. Mr. Bernet was born February 9, 1868, at Brant, Erie county, New York. He was educated in the public schools of Buffalo, and began railway work in 1889 as telegraph operator for the Lake Shore & Michigan Southern. He was advanced to train despatcher in March, 1895, was trainmaster of the Eastern division from April, 1901, to March, 1903, when he became assistant superintendent of that division. On February 1, 1905, he was made superintendent of the same division, and in November of that year he was promoted to assistant general superintendent of that road, which position he retained until October 1, 1906. He was then advanced to the general superintendency, with headquarters at Cleveland, Ohio. Mr. Bernet subsequently, on June 1, 1911, was made assistant to vice-president of the New York Central lines west of Buffalo, and was appointed assistant vice-president of the same lines on April 15, 1912. He now becomes vice-president of those roads, in charge of operation, maintenance and construction, with headquarters at Chicago, as noted above.

J. J. Bernet.

Operating Officers.

W. D. Jenkins, private secretary to President Freeman of the International & Great Northern, has been appointed inspector of transportation and stations of that road and the Texas & Pacific, with headquarters at New Orleans, La.

C. F. Smith, assistant superintendent of the Idaho division of the Oregon Short Line at Nampa, Idaho, has been appointed superintendent of the Montana division, with headquarters at Pocatello, Idaho, succeeding W. R. Armstrong, resigned.

Traffic Officers.

George J. Holder has been appointed traveling freight agent of the Lake Erie & Western, with headquarters at Spokane, Wash.

H. O. Post, city passenger agent of the Chicago Great Western at Des Moines, Ia., has resigned to go with the Star Land Company of Kansas City, Mo.

E. C. Ferguson has been appointed commercial agent of the Toledo, St. Louis & Western, with headquarters at Kansas City, Mo., in place of F. A. Eisminger, resigned.

Daniel J. McCarroll has been promoted to soliciting freight agent, of the Buffalo, Rochester & Pittsburgh, with office at Rochester, N. Y., succeeding W. A. Hammer, resigned to accept service with another company.

G. R. Bierman, traveling passenger agent of the Union Pacific system, with office at Chicago, has been transferred to Pittsburgh, Pa., as traveling passenger agent, in place of W. G. Carmichael, who has been appointed to a similar position at Chicago.

R. H. De Treville, traveling passenger agent of the Louisville & Nashville, at Evansville, Ind., has been appointed city passenger and ticket agent with office at Evansville succeeding L. C. Wolfe, resigned. W. M. Wood, traveling passenger agent at Nashville, Tenn., has been appointed traveling passenger agent succeeding Mr. De Treville, but with headquarters at St. Louis, Mo. W. H. Mustaine, city passenger agent at Nashville succeeds Mr. Wood, and D. R. Murray succeeds Mr. Mustaine.

George B. Haynes, whose appointment as general passenger agent of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, has already been announced in these columns, was born August 22, 1871, at Ainsworth, Iowa. He was graduated from the Omaha (Neb.) high school in 1890, and began railway work March 16, 1891, with the Union Pacific at Omaha. He entered the employ of the Chicago, Milwaukee & St. Paul, December 28, 1892, as a clerk in the office of the general western agent at Omaha, and was promoted to passenger agent June 1, 1893, being made city passenger agent in 1897. On June 1, 1903, Mr. Haynes was appointed traveling passenger agent, with headquarters at Chicago; from October 1, 1907, to July 15, 1911, he was immigration agent, and on the latter date he became assistant general passenger agent, which position he held at the time of his recent promotion to general passenger agent, as above noted.

Engineering and Rolling Stock Officers.

J. H. Roach has been appointed assistant engineer of construction of the Lake Shore & Michigan Southern, with headquarters at Cleveland, Ohio.

Samuel W. McClure has been appointed resident engineer of the Lake Shore & Michigan Southern at Erie, Pa., in place of H. W. Fenno, transferred.

C. F. W. Felt, chief engineer of the Atchison, Topeka & Santa Fe Railway proper, has been appointed chief engineer of the system, with headquarters at Chicago, succeding C. A. Morse, effective April first.

Frank Hopper, division master mechanic of the Chicago, Rock Island & Pacific at Estherville, Iowa, has been appointed master mechanic of the Duluth, Winnipeg & Pacific, with headquarters at West Duluth, Minn.

J. E. Saunders, assistant signal engineer of the Atchison, Topeka & Santa Fe, has resigned to become office engineer in the signal department of the Delaware, Lackawanna & Western, with headquarters at Hoboken, N. J.

R. L. Stewart, master mechanic of the Missouri division of the Chicago, Rock Island & Pacific at Trenton, Mo., has been appointed master mechanic of the Chicago Terminal and Illinois divisions, with headquarters at Chicago, in place of L. A. Richardson, promoted. E. J. Harris, master mechanic of the Kansas City Terminal division at Armourdale, Kan., succeeds Mr. Stewart. J. C. Rhodes, road foreman of equipment at Trenton, Mo., has been appointed master mechanic of the Dakota division, with headquarters at Estherville, Ia., succeeding Frank Hopper, resigned.

OBITUARY.

P. J. Tapp, commercial agent of the Southern, at Kansas City, Mo., died suddenly in that city on March 20, aged 50 years.

Howard W. Rogers, traveling freight agent of the Illinois Central, with headquarters at Kansas City, Mo., died in that city on March 14, aged 30 years.

E. A. Peck, superintendent of the St. Louis Southwestern, with headquarters at Pine Bluff, Ark., was found dead near Hot Springs, Ark., on March 20. It is stated that he committed suicide owing to continued ill health. Mr. Peck was 61 years old and had been superintendent at Pine Bluff since June, 1901. From June, 1893, to April, 1901, he was general superintendent of the St. Louis, Iron Mountain & Southern, and previous to December, 1892, he had been with the Cleveland, Cincinnati, Chicago & St. Louis for some years as an assistant general superintendent and general superintendent.

Abraham Fell, formerly general western freight agent of the Delaware, Lackawanna & Western at Buffalo, N. Y., died at his home in that city on January 19. He was born in England in 1832, and at the age of 13 began work on the London & North Western, remaining with that company until 1858, when he came to America and became superintendent of the Buffalo & Lake Huron, of Canada, with headquarters at Buffalo. He was subsequently made general manager. After the road was leased to the Grand Trunk, he became general agent of the Merchants' Despatch Transportation Company at Detroit, and later he went to Buffalo to establish that company's foreign freight business. He then returned to Detroit to go with the Detroit & Milwaukee, now a part of the Grand Trunk. In 1873 he was appointed eastern freight agent for the Michigan Central and the Great Western, with headquarters at Rochester, N. Y. Subsequently he represented the Great Western, at Buffalo, and later the Blue Line, Fast Freight Line, at Philadelphia, Pa., and at Scranton. When the Delaware, Lackawanna & Western completed its road from Binghamton to Buffalo, he was made general western freight agent of that road, with headquarters at Buffalo. He was instrumental in building up the freight business for the Lackawanna, also in establishing a line of steamboats on the lakes in connection with that road, the Lackawanna Transportation Company. After 20 years' service with the Lackawanna, and completing 51 years of railway service, he retired from active work.

ELECTRIFICATION OF LONDON'S SUBURBAN RAILWAYS.—The London, Brighton & South Coast Railway, England, which since 1909 has electrified some 70 miles of its suburban lines, has recently decided upon a further electrification to include, when completed, at least 170 miles of additional trackage. The work will be commenced as soon as the plans are completed and will extend over four years. The lines to be transformed will be divided into sections and the work will be proceeded with accordingly. Under the scheme the whole of the company's suburban system comprised within the area extending from London to Croydon, Purley, and Coulsdon, and from London to Sutton and Cheam, is to be electrified. This action has been decided upon in view of the satisfactory results of the company's electric service now in operation and of the steady growth of competition from other forms of transport, notably the street car and the motor bus.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE REPUBLIC IRON & STEEL COMPANY has ordered 1 six-wheel switching locomotive from the Baldwin Locomotive Works.

THE NORFOLK SOUTHERN has ordered 4 consolidation locomotives and 10 ten-wheel locomotives from the Baldwin Locomotive Works.

THE MAC A MAC CORPORATION has ordered 1 mogul locomotive from the American Locomotive Company. The dimensions of the cylinders will be 19 in. x 26 in.; the diameter of the driving wheels will be 56 in., and the total weight in working order will be 133,000 lbs.

THE BUFFALO, ROCHESTER & PITTSBURGH, mentioned in an unconfirmed item in the *Railway Age Gazette* of March 14, as having ordered 15 locomotives from the American Locomotive Company, has ordered 12 mikado locomotives and 3 Pacific type locomotives from that company.

THE INTERCOLONIAL has ordered 5 consolidation locomotives and 4 Pacific type locomotives from the Montreal Locomotive Company. The dimensions of the cylinders of the consolidation locomotives will be 24 in. x 32 in.; the diameter of the driving wheels will be 63 in., and the total weight in working order will be 236,000 lbs. The dimensions of the cylinders of the Pacific type locomotives will be 23½ in. x 28 in.; the diameter of the driving wheels will be 73 in., and the total weight in working order will be 245,000 lbs. All of these locomotives will be equipped with superheaters.

CAR BUILDING.

THE HOCKING VALLEY is in the market for 1,000 freight cars.

THE NEW JERSEY ZINC COMPANY is in the market for 12 dump cars.

THE ILLINOIS CENTRAL has ordered 1,000 fruit cars from the American Car & Foundry Company.

THE HAVANA CENTRAL is closing contracts as follows: American Car & Foundry Company, 450 flat cars; Standard Steel Car Company, 250 box cars; Wason Manufacturing Company, 12 passenger cars. This company is still in the market for 50 coal cars.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 27 all-steel passenger cars from the Pullman Company. This order will comprise 2 café observation cars, 3 combination passenger and mail cars, 3 baggage cars, 2 combination baggage and mail cars, 10 coaches and 7 combination baggage and passenger cars.

IRON AND STEEL.

THE CHICAGO & ALTON has ordered 7,000 tons of rails from the Illinois Steel Company.

SIGNALING.

The Southern Railway is to install automatic block signals on the line between Alexandria, Va., and Orange, Va., 78 miles. With the automatic block system of the Washington Terminal Company, the entire line from Washington, D. C., to Orange, Va., on the completion of this work, will be operated under automatic signals.

RAILROAD TO CONNECT SPAIN AND FRANCE.—Construction work is under way on the Trans-Pyrenean Railway, which will connect Ax, in the southeastern corner of France, with Puigcerda and Ripoll, in the province of Gerona, in the northeastern portion of Spain. The distance from Ripoll to Puigcerda is about 22 miles, and the distance from Puigcera to Ax is about 25 miles. Work on the Tosas tunnel, about half way between Ripoll and Puigcerda, which will be 3.1 miles long, has been commenced. This tunnel is being driven from both sides and on the southern side about 200 yds. have already been completed.

Supply Trade News.

F. A. Mazzur & Co., 141 Milk street, Boston, Mass., have been appointed New England representatives for the Kerr Turbine Company, Wellsville, N. Y.

The Beaver Dam Malleable Iron Company, Beaver Dam, Wis., has moved its New York office from 30 Church street, to the Grand Central Terminal building.

The Galena Signal Oil Company, Franklin, Pa., has declared a common stock dividend of 50 per cent. This distribution will increase the company's common stock from $8,000,000 to $12,000,000, as has been authorized by the stockholders.

The Railway Steel-Spring Company, New York, has declared a dividend of 2 per cent. on its common stock. This is the first dividend on the common stock paid by this company since 1908. Last year the company earned nearly 6 per cent. on the common stock, compared with about one-quarter of 1 per cent. in 1911.

Chrome-vanadium steel, made by the American Vanadium Company, Pittsburgh, Pa., has been specified for the main axles and main crank pins of the 60 mikado locomotives and 30 Pacific type locomotives recently ordered by the Baltimore & Ohio. The tires of the 10 Mallet locomotives recently ordered by that road will be made of the same material.

The Universal Portland Cement Company has started work on the construction of a new plant at Duluth, Minn. This plant will cost about $1,700,000, and will have an output of 1,400,000 bbls. of Universal Portland cement a year. The plant will be electrically operated throughout, requiring about 5,000 h. p. Work will be pushed as rapidly as possible, and it is expected that the plant will be in operation in 1914. With its present plants at Chicago and Pittsburgh this will give the company a total output of 45,000 bbls. a day, or 13,500,000 bbls. a year. During the year 1912, the banner year of the company, the shipments of Universal Portland cement amounted to 10,047,499 bbls.

W. H. Foster has resigned as master mechanic of the Hudson division of the New York Central & Hudson River, to accept a position with the Ashton Valve Company, as representative in the railroad department, with headquarters in New York. Mr. Foster was born June 29, 1873, and entered railway service in June, 1889. After considerable experience in shop work, and as fireman and locomotive engineer, he became air brake instructor for the American Magazine Company, and later became connected in the same capacity with the International Correspondence Schools. In February, 1902, he was appointed supervisor of air brakes for the New York Central, and in 1907 his jurisdiction was extended over the Boston & Albany, which placed him in charge of air brake instruction on all divisions of the New York Central lines east of Buffalo. On January 1, 1908, he was promoted to master mechanic.

Announcement has been made of a plan for the reorganization of the Allis-Chalmers Company, following the sale of the properties of the old company in Wisconsin to the reorganization committee, pursuant to the order of the United States district court of Milwaukee. The new company has been organized under the name of the Allis-Chalmers Manufacturing Company. It is expected that the remaining properties in Illinois, Pennsylvania and California also will shortly be acquired on behalf of the reorganization committee. The properties will be taken over by the new company and operations conducted under the new management at an early date. The board of directors of the new company has been elected as follows: Otto H. Falk, president, Milwaukee; Oliver C. Fuller, president Wisconsin Trust Company, Milwaukee; J. D. Mortimer, president Milwaukee Light, Heat and Traction Company, Milwaukee; Gustave Pabst, president Pabst Brewing Company, Milwaukee; Fred Vogel, Jr., president First National Bank of Milwaukee; Max Pam, Chicago; F. O. Wetmore, vice-president First National Bank, Chicago; John H. McClement, chairman of the board, New York; Arthur W. Butler, of Butler, Herrick & Kip, New York; Charles W. Cox, of Robert Winthrop & Co., New York; Oscar L. Gubelman, of Knauth, Nachod & Kuhne, New York; R. G. Hutchins, Jr., vice-president National Bank of Commerce, New York; Arthur Coppell, of Maitland, Coppell & Company, New York; William C. Potter, vice-president Guaranty Trust Company of New York; and James P. Winchester, president Wilmington Trust Company, Wilmington, Del. The board of directors has appointed an executive committee consisting of Mr. Vogel, chairman, and Messrs. Falk, Fuller, Mortimer and Pabst.

Samuel T. Fulton, general sales agent of the Railway Steel Spring Company, New York, with office in that city, has been made a vice-president of that company, with office in New York.

S. T. Fulton.

Mr. Fulton was born at Topeka, Kan., January 11, 1856, and after receiving a public school education entered railway service as messenger in the telegraph office of the Kansas Pacific at Topeka on July 1, 1879. During the next four years he was telegraph operator and agent at various stations on the Kansas Pacific and Union Pacific and for the following two years telegraph operator for the Western Union Telegraph Company at Topeka. He went to the Atchison, Topeka & Santa Fe as secretary to the superintendent of machinery in 1885; and in 1888 was made secretary to the general superintendent at Chicago. In 1889 he went to the Chesapeake & Ohio as train despatcher, and in 1890 he was made secretary to the freight traffic manager of the Cleveland, Cincinnati, Chicago & St. Louis. He became a stenographer to the chairman of the Central Traffic Association of Chicago in 1891 and in the following year was made secretary to the freight traffic manager of the Kansas City & Memphis. In 1893 he became chief clerk to the general superintendent of the same road; in 1895, chief clerk to the president and general manager, and in 1899, assistant to the president of that road. He was made chief clerk to the vice-president and general manager of the St. Louis & San Francisco at St. Louis in August, 1901, and from January, 1902 to February, 1903, he was general manager of the Crowe Coal & Mining Company, of Kansas City. On resigning that position he returned to railway service as assistant to the vice-president of the St. Louis & San Francisco, and in April, 1904, he went to the Chicago, Rock Island & Pacific as assistant to the president, which position he held until December 1, 1909. After the segregation of the Rock Island and the Frisco, Mr. Fulton entered the railway supply business as western manager of the Railway Steel Spring Company, with office at Chicago. On March 1, 1912, he was made general sales agent of that company, which position he held until his appointment to the vice-presidency, as mentioned above.

TRADE PUBLICATIONS.

Chicago & North Western.—The passenger department has issued an interesting illustrated pamphlet on "How to Grow Sugar Beets."

Blacksmithing.—Tate, Jones & Company, Inc., Pittsburgh, Pa., has published a small instructive folder on Blacksmithing and drop forging.

Battery Charging.—The General Electric Company has devoted bulletin No. 4085 to its battery charging motor generator sets for railway signaling.

Motor Cars.—The Buda Company has issued a folder devoted to its various types of section motor cars, inspection motor cars and track velocipede cars.

Denver & Rio Grande.—The passenger department has issued an interesting folder describing the attractions of its route to the Pacific coast in connection with the Twenty-sixth annual convention of the United Society of Christian Endeavor, to be held in Los Angeles, July 9 to 14.

Railway Construction.

ARTESIAN BELT.—This company has given a contract for building an extension, it is said, from Christine, Tex., southwest to Crowther, and work will be started at once.

BIG BLACKFOOT.—See Chicago, Milwaukee & St. Paul.

BIG SANDY & KENTUCKY.—An officer is quoted as saying that a contract has been given to John O'Kelley, Ashland, Ky., to build a section of 10 miles from Stafford station south. This company was incorporated last year to build from a point on the Chesapeake & Ohio in Johnson county, Ky., south to coal and timber lands, in all about 31 miles. W. H. Dawkins, president, T. N. Fannin, vice-president, Ashland, Ky., and L. N. Davis, treasurer. (September 27, p. 598.)

BIRMINGHAM & TUSCALOOSA RAILWAY & UTILITIES COMPANY.—Incorporated in Alabama, it is said, to build from Gadsden southwest via Attalla, Ashville, Birmingham and Bessemer to Tuscaloosa, about 130 miles, and to operate a belt line in Tuscaloosa county. The incorporators include C. R. Carter and C. A. Gannon of Birmingham.

BRYAN & COLLEGE INTERURBAN.—This company will extend its line, it is said, from Bryan, Tex., to Stone City, 6 miles.

BUFFALO, ROCHESTER & PITTSBURGH.—This company will let contracts at an early date, it is said, for laying second track between Rochester, N. Y., and Scottsville, 12 miles. Contracts will also be let for the construction of a classification yard on the south side of the barge canal, two miles outside the city of Rochester. Ten miles of track will be laid in the yard.

CAMBRIDGE & CHESAPEAKE.—This company will build a 25-mile line, it is said, from Cambridge, Md., southwest via Church Creek and Taylors Island, to Fox Creek. V. C. Carroll, Cambridge, may be addressed.

CANADIAN PACIFIC.—Contracts for building the final section of the Kootenay Central through the Windermere valley in British Columbia are reported let as follows: To Burns & Jordan, Spokane, Wash., for work on 60 miles. Another contract for work on 20 miles has been let to Boomer & Hughes, also of Spokane.

CHICAGO, MILWAUKEE & ST. PAUL.—According to press report the Big Blackfoot Railway, a subsidiary of the Chicago, Milwaukee & St. Paul, has asked permission to change its articles of incorporation in Montana, to allow it to extend from the south line of section 20, township 14 north, range 11 west, in Powell county, Mont., near Ovando, northeast through Lewis and Clark county, to a point on or near Sun river in township 21 north, range 1 west, near Fort Shaw, in Cascade county, about 110 miles. John R. Toole, president.

GAINESVILLE & NORTHWESTERN.—This road is now in operation from Gainesville, Ga., north to North Helen 37 miles.

INDEPENDENCE, NEODESHA & TOPEKA TRACTION.—Surveys have been made for a line, it is said, from Neodesha, Kan., south to Independence, about 20 miles. Dr. T. Blakesley, president, Neodesha.

INTERNATIONAL & GREAT NORTHERN.—President T. J. Freeman is quoted as saying that the International & Great Northern and the Texas & Pacific will carry out a large amount of improvement work during the present year. The entire eastern division of the T. & P. will be re-ballasted from Texarkana, Ark., to Fort Worth, Tex. New rails are also to be laid on sections of the T. & P. and the I. & G. N.

INTERSTATE DEVELOPMENT COMPANY'S LINES.—An officer writes that the company was organized, to promote and construct about 982 miles of main and branch lines. A point on the Gulf of Mexico in Texas will be one of the terminals. All preliminary reports, estimates of cost of construction and equipment have been approved and accepted by the financial backers. The company expects to develop a traffic in lumber, cotton, live stock, agricultural products and mineral products. Dr. R. B. Bledsoe, president, and Colonel C. A. McCarthy, secretary and chief engineer, both of Lufkin, Tex. (See Texas Roads, March 14, p. 530.)

INTERSTATE RAILROAD & TRACTION.—Incorporated in Kansas with $500,000 capital, and headquarters at Blackwell, Okla., to build from Arkansas City, Kan., south via Chilocco, Okla., Blackwell and Tontkawa to Ponca City, about 50 miles. O. L. Brown, president, Arkansas City, Kan., J. M. Van Winkle and C. B. Harold of Ponca City, Okla., and W. L. Cunningham, Arkansas City, Kan., are incorporators.

IOWA NORTHERN.—Incorporated in Iowa, it is said, to build from Clinton, Iowa, northwest to Turkey river in Clayton county. S. G. Durant, president, Clinton.

LEHIGH VALLEY.—A contract has been given to F. H. Clemmens & Company, for excavation work and putting in an additional track, at the entrance to the Bethlehem Steel Works, South Bethlehem, Pa. The cost of the work is $50,000.

MILWAUKEE, PEORIA & ST. LOUIS.—According to press report financial arrangements have been made and work will probably be started next June on the line projected some time ago from Peoria, Ill., north to Rockford, 120 miles. F. W. Cherry, Princeton, Ill., is back of the project, and B. Schreiner is chief engineer. (January 26, 1912, p. 176.)

MISSOURI, KANSAS & TEXAS.—President C. E. Schaff is quoted as saying, that the company will not begin work at an early date constructing the extensions that are provided for in the bill authorizing the merger of several of the company's lines in Texas into the M. K. & T. system. Improvements to cost more than $2,000,000 will be made this year on the Texas lines. The construction of the gap between the main line and the Trinity-Colmesneil line will be carried on as rapidly as possible. (March 14, p. 529.)

PACIFIC & IDAHO NORTHERN.—An officer is quoted as saying that the company is planning to build the extension this year from New Meadows, Idaho, north along the Little Salmon river to Riggins, 35 miles. (November 29, p. 1063.)

RICHMOND, PORTLAND & FORT WAYNE (Electric).—Incorporated in Indiana with $100,000 capital, and principal office at Portland, Ind., to build from Fort Wayne, south via Decatur, Berne, Geneva, Portland, Winchester and Lyon to Richmond, about 90 miles. G. S. Straub, C. F. Harbison, R. J. McCarty and C. H. Frank are directors.

SAN ANTONIO & AUSTIN INTERURBAN.—Surveys are being made for the line from San Antonio, Tex., northeast to Austin, with a branch to Seguin, and construction will be started within a few weeks. W. B. Tuttle, of San Antonio, is at the head of the project. (January 24, p. 191.)

SAVANNAH & SOUTHERN.—An officer of this company, which operates a line from Norden, Ga., southwest to Willie 13 miles, and 4 miles of spur lines, writes that surveys are being made for an extension from Willie southwest to Glenville, about 20 miles. The company plans to eventually build an extension east via Clyde to Savannah.

SEATTLE, PORT ANGELES & LAKE CRESCENT.—A contract has been given to the C. J. Erickson Construction Company to build from Oak Bay, Wash., via Sequim and Port Angeles, thence west via Lake Crescent. The work is now under way, and includes a trestle over the Elwah river. There will also be a two-mile sea wall at Port Angeles bay. Michael Earles, president; M. C. Morrow, secretary, and C. J. Erickson, chief engineer, Downs building, Seattle.

SIOUX VALLEY & NORTHERN.—Incorporation will be asked for soon by this company, with a capital of $1,000,000 and headquarters at Watertown, S. Dak. The plans call for building through Codington, Grant and Roberts county to the north line of South Dakota, about 100 miles. The incorporators include F. T. Heathcote, C. T. Jones, T. N. Bergam, J. E. Mitchell and Mark Johnson.

SOUTHERN PACIFIC.—An officer writes that all the contracts are let for building the Willametta-Pacific from Eugene, Ore., west to a point on the Pacific coast near the Suislaw river, thence south to Marshfield, about 123 miles. Twohy Bros., and McArthur, Perks & Company, Ltd., are the contractors.

SOUTHERN TRACTION.—This company is building between Dallas and Waco and between Dallas and Corsicana, a total of 158 miles. The Waco division will eventually be extended south to Austin, about 100 miles. The line is in operation between Dallas and Waxahachie and the section to Waco will be completed

about July 1. The line to Corsicana is under contract to be finished by August. (January 10, p. 88.)

Southwestern Traction.—This company is planning to build an extension, it is said, from Temple, Tex., northeast to Marlin, about 30 miles.

Texas & Pacific.—See International & Great Northern.

Texas Roads (Electric).—The Stone & Webster Engineering Corporation, Boston, Mass., is making plans, it is said, to build an interurban line between Dallas, Tex., and Terrell, about 30 miles, and between Beaumont and Port Arthur, 25 miles. It also owns the Rio Grande Valley Traction, which was organized to build between El Paso and Fabens, about 30 miles.

A syndicate of Houston, Tex., and Beaumont men, represented by John W. Maxcy, an engineer of Houston, is said to be promoting the construction of an interurban line between Austin and San Antonio, via Lockhart. The plans also call for extending the line east to Houston.

Joseph A. Davidson, of Indianapolis, Ind., and associates, are reported back of a project to build an interurban line between Austin, Tex., and Smithville via Lockhart, Stowall and Bastrop, about 40 miles.

E. P. Turner, of Dallas, Tex., and associates are promoting the construction of an interurban line, it is said, between Dallas and Wichita Falls via Denton, about 150 miles, and between Dallas and Glenrose, about 60 miles.

Willametta-Pacific.—See Southern Pacific.

RAILWAY STRUCTURES.

Catasauqua, Pa.—The Central of New Jersey has given a contract to the American Bridge Company, New York, for putting up a through riveted truss over the Lehigh canal in Catasauqua.

Fairbury, Neb.—The Chicago, Rock Island & Pacific has announced that appropriations have been made for the enlargement of its shops at this point, the erection of a $30,000 passenger station, and additional freight facilities.

Frankfort, Ind.—The Lake Erie & Western is to begin work shortly on the erection of a new station and freight house.

Miller, Ind.—It is reported that the Baltimore & Ohio will expend $800,000 in leveling the sand dunes, and constructing yards and a terminal at this point.

Muskogee, Okla.—The Missouri, Oklahoma & Gulf has let contracts for the erection of new shops and other improvements at this point, to cost about $250,000.

Newnan, Ga.—The Central of Georgia and the city officers of Newnan will jointly put up a 125 ft. span steel truss over the tracks of the Central of Georgia, with trestle approaches in Newnan. The bridge construction is being carried on by the railway company's forces, and the approaches by the city officers.

South Bend, Ind.—The Grand Trunk has announced that work will be started immediately on the erection of a new $50,000 passenger station.

Syracuse, Ind.—The Baltimore & Ohio has given a contract to the Youngstown Construction Co., New York, to build a passenger station at Syracuse. It will be of pressed brick and red tile construction with tile floors, 69 ft. x 21 ft. The improvements will cost about $13,000.

Walkerton, Ind.—A contract has been given by the Baltimore & Ohio to P. Farrell, Cincinnati, Ohio, to build a passenger station at Walkerton. It will be of pressed brick construction, with red tile roof and tile floors, 55 ft. x 30 ft. The platforms will be of brick with concrete curbs. The cost of the station will be about $10,000.

Specifications for New Line in Ecuador.—Specifications for the construction of the Babahoya-to-Balzapamba railroad, Ecuador, will be loaned on application to the Bureau of Foreign and Domestic Commerce at Washington. This is to be a 37¼ mile line from the city of Babahoya, capital of the province of Los Rios to the village of Balzapamba.

Railway Financial News.

Atlantic & North Carolina.—*The Commercial & Financial Chronicle* says that E. C. Duncan, vice-president of the Raleigh, Charlotte & Southern, has offered to all stockholders of the Atlantic & North Carolina to buy their stock at 75. The state of North Carolina owns $1,266,500 of the total $1,797,200 stock. The state has appointed a special committee to make recommendations to the legislature in regard to this offer.

Canada Southern.—The New York Stock Exchange has listed $22,500,000 consolidated guaranteed 5 per cent. bonds of 1912-1962, guaranteed principal and interest by the Michigan Central.

Chicago & Alton.—The $2,500,000 3-year 5 per cent. notes which matured March 15 were paid in cash at the United States Mortgage & Trust Company, New York.

Mexican Union.—This company, which took over the Torres & Minas-Prietas Railway, has authorized an issue of prior lien debenture bonds to pay for completing the line to Ures. The first mortgage debenture bondholders have voted to accept a reduction in interest on their bonds from 6 per cent. to 3 per cent., making the agreement retroactive and effective August 12.

New York Central & Hudson River.—Stockholders are to vote on April 16 on the question of consolidating with the New York Central, the Rome, Watertown & Ogdensburg and other subsidiary companies. The plan will call for an increase in capital stock outstanding of the N. Y. C. & H. R. of $2,851,700.

Norfolk & Western.—The subscriptions for the new issue of Norfolk & Western convertible 4½ per cent. bonds closed Tuesday. The stockholders very generally took their allotments and of the $18,353,000 offered approximately $17,500,000 or 95 per cent. was subscribed. Of this subscription about $11,000,000 was first instalment paid and $6,500,000 was full paid.

Pennsylvania Railroad.—The directors have approved of the long term lease of the railroad property and franchise of the West Jersey & Seashore on the terms prescribed by the latter company, namely:

1. A guaranteed rental of 6 per cent. per annum on the common stock.
2. The interest on its bonds, taxes and other fixed charges.
3. The lease to become effective July 1, 1913.
4. On July 1, 1913, when the new lease goes into effect a dividend of 1½ per cent. in cash is to be paid to the common stockholders.

The lease will be submitted for approval by the stockholders of the W. J. & S. S., at a special meeting to be called for that purpose on April 30, 1913.

Pere Marquette.—At the sale of the $16,000,000 5 per cent. 50-year improvement and refunding mortgage bonds on Thursday of last week, mentioned in the *Railway Age Gazette* of March 21, the bonds were bid in by the committee representing the $8,000,000 6 per cent. noteholders under which notes these bonds were deposited as collateral. The price bid was $6,400,000.

Toledo & Chicago Interurban.—The superior court of Allen county, Ind., has ordered the sale of this electric road at an upset price of $550,000.

Railway Development in Chile.—The Chilean government's railway extension program very thoroughly covers the country and when completed will be one of the most complete systems in Latin America. At the close of 1912 there were 2,393 miles of government railways in operation, with 1,337 miles under construction, and 3,008 miles of projected railways, making in all 6,738 miles. The government has under consideration the making of a loan sufficient to equip the railways properly with rolling stock and to double track certain portions of the lines where the traffic is exceptionally heavy, as between Valparaiso and Santiago.